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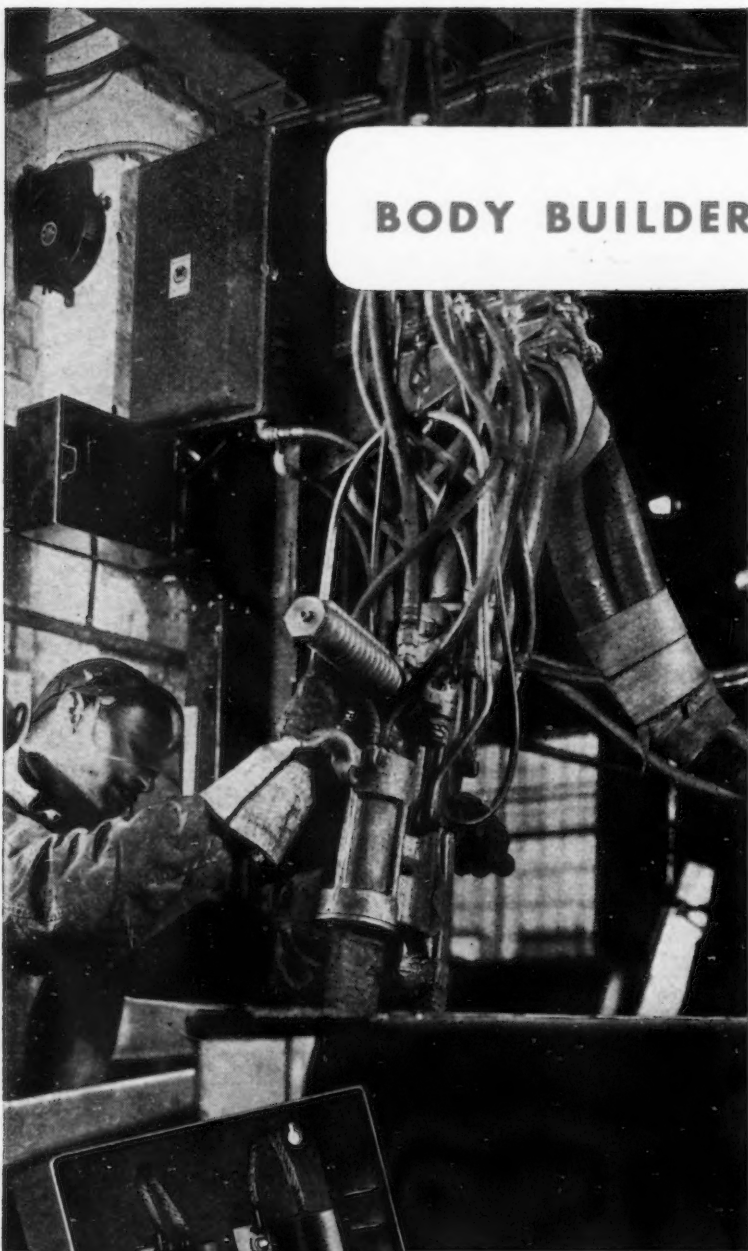
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NOV. 28, 1940

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The Capitol Roof

THE Associated Press reported last week that the Capitol roof in Washington is causing concern to our legislators. It is getting shaky.

That roof has indeed done yeoman service. It has demonstrated its resistance to the reverberating oratory of several generations of Republicans, Democrats and Independents and one part of a generation of New Dealers. It has withstood the vocal vibration velocities of the late lamented Huey Long and other equally eloquent and powerful masters of the mellifluous marathon. And not once, in all these years of attack from within has it shivered its timbers.

But now the Capitol roof is getting shaky. Experts say the conditions of the roofs over both the Senate and the House chambers are very dangerous. A heavy snow storm could cave them both in." So reported the new Democratic House leader last week in arguing for adjournment.

Now none of us, I am sure, whatever our political beliefs, want to see the persons of our elected representatives subjected to undue risk. We are not anxious to wake up some morning and learn that all that is left of Congress is a conglomeration of legislative arms and legs protruding helplessly from a miscellaneous mixture of shattered plaster, mashed mosaics, shattered roof beams and snow. For that would mean the permanent adjournment of Congress. And we are going to need Congress on the job more than ever after the holidays.

So instead of condemning the prudence which causes our Congressmen, or at least those of them who want to go home to look to their roofs, let us applaud their foresight. It was a wise thing to call in the engineers to see if the structure was weakening and to say whether or not it would carry the load. And when the engineers say that the roofs should be strengthened to guard against the weight of winter's snow, it would indeed be wise to take their advice. Either strengthen the roofs or make sure that the snow will not pile up to a dangerous weight.

Snow, you know works insidiously to pile up its load. It comes down flake by flake, each flake disregarded as too small and unimportant to worry about. But the snow piles up.

How many snow flakes does it take to make a dangerous load? Probably a million of them settling on the Capitol roof would not make much difference. Perhaps it could stand a billion of them. Possibly 65 billion.

The thing to do is to find out. That is what our legislators are for, to find out when loads become dangerous and guard against them. Let's applaud them for keeping their eyes open.

John H. H. H. H.



Airplane View of the Principal Plant of Inland Steel Company

This aerial photograph, taken at an altitude of 1,000 feet, shows the Indiana Harbor Works, on the south shore of Lake Michigan. The No. 1 unit, and the administration building, are in the foreground. Across the tracks is the No. 2 unit, with the 76-in. and the new 44-in. continuous sheet and strip mills at the right. The capacity of this modern plant has been increased 40 per cent in the last eight years.

Aluminum Alloy Extrusion

By ERNEST V. PANNELL

THE technique of extrusion is more highly developed in Europe than in this country, with carbon and alloy steels so produced in large quantities there. Light alloys, also, are extruded in very large tonnages, and the practices employed are of great interest today in view of the heavy demands developing in this country due to general rearmament and heavy aircraft demands. Thus this article by Mr. Pannell is very timely and of great value. The author is associated with British Aluminum Co., Ltd., but the views expressed herein are his own rather than those of the company.

SINCE the first commercial development of the extrusion process by Alexander Dick in 1894 the art has steadily advanced not only in tonnage and capacity but also in the range of metals used. The first aluminum was extruded about the year 1910, and this was followed shortly by the extrusion of aluminum alloys which were extensively used in the last war. Later, the introduction of strong heat treated light alloys demanded greatly improved production technique coupled with more powerful presses. These latter have shown the most distinct advances in Europe, and presses of German and British design have been installed in practically all industrial countries.

That extrusion is a cheaper process than rolling or drawing is evident from the fact that a finished product may be produced by one pass through the die instead of by 15 to 20 passes on the rolls or draw bench. The disadvantage, however, is that the extruded rod or section is less thoroughly worked in a mechanical sense, since it is pressed through the die practically

at its annealing temperature. This fact has rendered the extrusion process especially valuable for heat treated alloys as the finished shapes are first produced and then hardened by quenching and precipitation in the usual way. Structural sections and tubes for aircraft, high tensile machine bar stock and a variety of sections for machine components are produced in this way. Other extruded forms are blanks for re-rolling into sheets and tubes, which are produced both in the pure and alloyed forms.

Progress of the art during the last 30 years is shown by increase in the capacity of presses from 500 to 6000 tons and in the weight of billet from 100 to 1200 lb. Pressure on the metal is now commonly from 50,000 to 100,000 lb. per sq. in. and the speed of extruding a single billet varies from 30 sec. to as many minutes.

EXTRUSION PRESS DESIGN: In the diagram (Fig. 1) a simple form of extrusion press is shown in sectional plan. The proportions are those for a 2000-ton press working with a 7-in. container. Four steel tie rods connect the main cylinder with the head or front platen of the machine and at the same time afford a guide for the crosshead or rear platen. The platen

moves forward with the ram and extended plunger and the latter enters the container and forces the metal through the die. A suitable metal pad is inserted between plunger and billet to protect the former and to act as a piston in the container. The tie rods form a guide for the moving parts supporting both container and crosshead. The former can be backed away from the head by a hydraulic cylinder of short stroke; this enables the die to be inspected and the container cleaned out.

The die itself is seated in a die block or bolster which rests in the head and is locked in place by a U shaped steel forging. This lock can be raised or lowered by a separate hydraulic cylinder and at the end of the working stroke it is released so that the die with the metal slug or residue can be pushed right out on to the receiving table. This enables the rod to be cut off by a circular saw, pulled through the die and the slug removed; the latter may be from 1 to 2 in. thick and amounts to 5 to 10 per cent of the billet.

The container is one of the most important parts of the machine as it has to withstand both high pressure and temperature; a burst container

has not been an unknown occurrence in the early days of the process. This component is usually of carbon steel with a liner of chromium-tungsten or chromium-molybdenum metal. In view of the temperature stresses there is a tendency among German designers to use a liner of a higher expansion coefficient than the body of the container; this compensates for the effect of the heating jacket on the outside. This latter was heated by a gas or oil burner in earlier designs but electric resistor or induction heating is now more usual, coupled with thermostatic control.

Containers are of various bores and can be rapidly changed according to the work in hand. Generally the bore has some relation to the area of the section being pressed and a reduction of from 10:1 to 20:1 is not unusual. Extruding a large size rod from a small container results in the material not being sufficiently worked especially in the core; this might be satisfactory for subsequent working but not for a finished structural part.

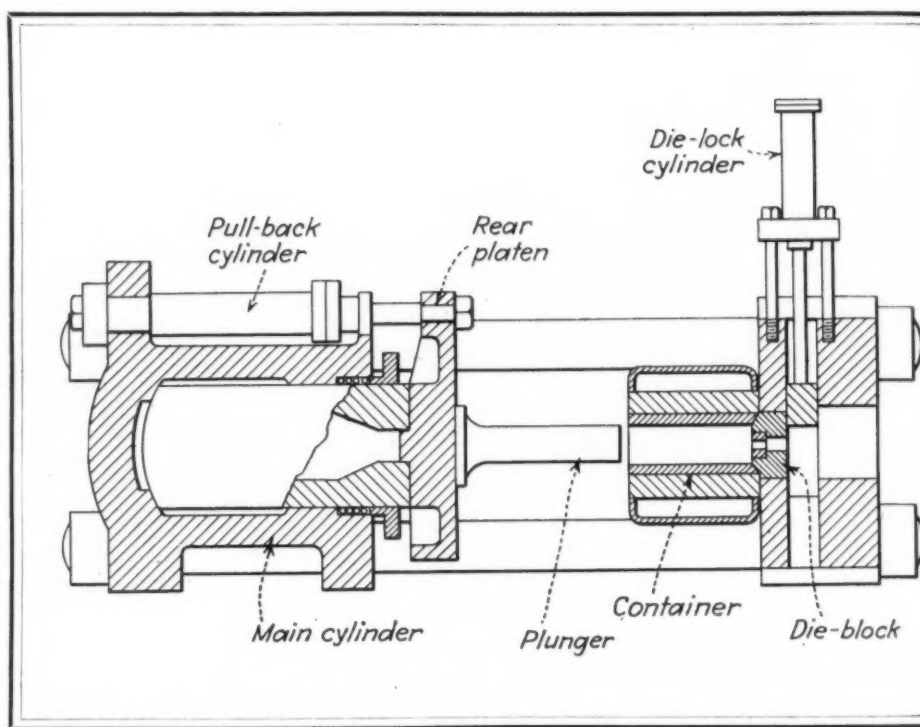
After the container, the die is perhaps the most important component; it must resist the full working pressure in addition to the friction of the extruded metal at a temperature of 800 deg. to 900 deg. F. So far the water cooling of dies is still experimental. A steel of 8 per cent tungsten, 2 per cent chromium and 0.5 per cent vanadium is being used in Germany for the heaviest service. For lighter work a chromium-molybdenum composition is used, the same being employed for the die block and the circular pad or follower used in the container. The die, or more properly, the die insert is placed with its face or pattern up against the billet end and is relieved or backed off slightly on its rear side. Its design is therefore not unlike a wire drawing die and its action on the metal calls for an abrupt change in area. At one time it was thought that the extruded metal was sufficiently worked by pressure to be treated as a fluid and dies were made funnel shaped—this was an error and the dies were burst when the load came on. A good deal of inconvenience is caused by the adhesion of aluminum to the die face and attempts have been made to coat or spray the die so that the metal slug can be more easily removed at the end of each stroke.

At the other end of the press, beside the main cylinder, will be noted the pull-back cylinder with its ram which operates on the return stroke with low pressure water. In modern presses it is more general to furnish two cylinders

for this purpose to secure better and more balanced action on the cross-head. In view of the great force of the working stroke the chief problem of design is to maintain perfect alignment at all times. Any tendency for the action to get out of center will be cumulative and probably reach a point where friction will render the press inoperative. What is no less important is that the extruded product will cease to be true and the production of concentric tubes will be impossible.

It will be seen that the press shown

die; plunger and ram are hollow throughout, the latter having an extended hollow tailrod working through a gland. The die is mounted at the front of the plunger and as it is pressed into the metal billet, the latter is extruded through die and plunger and out through the rear of the press. Certain limitations attach to this process but it is widely employed in Europe. The hollow ram together with a hollow plunger are employed in tube pressing; in this case an auxiliary cylinder extends out at



in Fig. 1 is "muzzle loading," i.e. both the billet and die are pushed in from the front end and locked. Presses of the "breach loading" type are also built and have certain advantages. If the billet is inserted in the back of the container however the plunger will have to be retracted to make sufficient room and this would require an addition of 2 or 3 ft. to the total length of the machine. One maker avoids this difficulty by use of a plunger which is hinged to the crosshead and can be swung out of line when charging. Another ingenious design has the container mounted on a rising table—it is lifted, charged with a new billet and lowered into place while the die is being inspected and cleaned after the last stroke.

The preceding description deals with "direct" extrusion. In the "inverted" process, the container is fitted with a solid plug in place of the

the rear of the main cylinder and the auxiliary plunger forms a mandrel which passes through the center of the main ram. This mandrel pierces the billet and travels up to the die where it stops. The main ram then operates to press the metal through the die and around the mandrel which locates the bore of the tube.

Fundamentally all extrusion press designs are based on the foregoing description. In recent years, however, European practice has evolved some remarkable developments with respect to size, power, and general adaptability.

SCHLOEMANN PRESS: An outline sketch of the Schloemann machine is shown in Fig. 2, and it will be noted that the design is extremely simple. Except in the largest sizes, three tie rods are used connecting the main cylinder with the head, the effect being to give better and more permanent

alignment under load. In addition a patented method is employed to maintain true centrality of the container. The latter is seated permanently in the front platen which is in two parts. The lower portion forms the bed of the machine and is supported by the main foundations; it also carries the thrust of the two lower tie rods. The upper portion which carries the container is supported by a series of adjusting bolts enabling it to be elevated or depressed with a very close degree of accuracy.

This operates a chisel or guillotine and is set in motion when the slug and die have been pushed out at the end of the stroke. The chisel is forced between the die face and the metal residue and cuts off the pigtail at the center. Before this is done, however, the section or tube is usually severed by an automatic circular saw which operates just in front of the head at the finish of each working stroke. A further device sometimes used to clean the die is a steel plug of the pattern being extruded; this

Where smaller sections are produced, the use of a large container and press increases production if a multiple die is also employed. For simple round and hexagonal rods this method is usually employed and four, six or more similar or different sizes are extruded from one die at one time. The only limitation is the number which can be picked up and handled.

The 6000-ton press already referred to uses four in place of three tie rods and is also equipped with a pair of short-stroke cylinders for shifting the container. The main features of the Schloemann design are otherwise unchanged, however. Operating with a 20-in. bore container, a billet of aluminum or light alloy weighing 1200 lb. can be extruded and structural angles and other sections can be produced 18 in. across. Part of the production will be in the form of rods of 5 to 8 in. diameter; these are cropped to length after extrusion and used as billets for re-extrusion in a smaller press. This double operation gives a remarkably improved metal in respect of uniformity and close grain.

While the Schloemann press is made in a variety of designs for the production of sections, tubes and slabs, it is not widely employed for the inverted process, since this process is not generally favored by the makers.

For the production of small diameter tubes a vertical press is generally preferred to that just described. The reason is that the vertical arrangement gives little or no liability to run out of center by expansion or wear, and concentric tubes of light gage can therefore be extruded to close tolerances. Such presses are made up to 1500 tons capacity and in detail are closely related to the horizontal type. In dealing with the extruded product a curved runway is provided, the tube being run out horizontally on a lower floor. In the Schloemann vertical press, a cast steel frame takes the place of the tie rod construction. This frame is centered and the cylinder bore, container bore and guide faces are turned in one operation thus securing the maximum truth and concentricity.

KRUPP PRESS: For many years the Fried. Krupp Grusonwerk A.G. of Magdeburg have built extrusion presses of the conventional design with four tie rods connecting the horizontal cylinder and head. Their most modern design as indicated in Fig. 3 strikes a new note, the frame consisting of a heavy cast steel yoke the rear end of which embraces the forged steel main cylinder and the front having a bracket to support the die holder. Im-

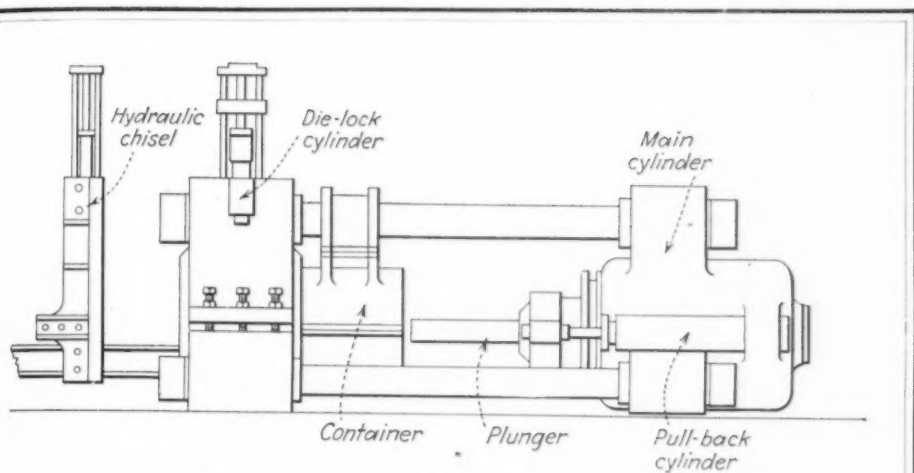


FIG. 2—Schloemann type of extrusion press.

FIG. 1—Extrusion press in sectional plan showing the main working parts.

At the rear end of the main cylinder a flanged cover plate will be noted; this provides for the attachment of the tube piercing cylinder which extends out at the rear end of the press and operates its plunger through a gland and through the main ram in the usual way. Twin pullback cylinders and rams are attached to the crosshead and operated by low pressure water.

The container is supported from the upper tie rod and is seated in the head of the machine. It is surrounded by its heating jacket and equipped with electric induction heaters and thermostat control. A tunnel runs through the front platen and in it is seated the die block; this is locked in place by the usual steel U piece which can be drawn up or down by its overhead hydraulic cylinder.

In front of the head is the receiving table on which is mounted a frame supporting a vertical hydraulic cylin-

der. This operates a chisel or guillotine and is set in motion when the slug and die have been pushed out at the end of the stroke. The chisel is forced between the die face and the metal residue and cuts off the pigtail at the center. Before this is done, however, the section or tube is usually severed by an automatic circular saw which operates just in front of the head at the finish of each working stroke. A further device sometimes used to clean the die is a steel plug of the pattern being extruded; this

Schloemann presses have been built of 3000 to 6000 tons capacity with a container size respectively of 16 and 20 in. Generally the maximum bore of container is used with pure aluminum but for the higher pressures necessary with heat treated alloys a diameter of 10 to 20 per cent less is more usual. A 3000-ton press with a 16-in. container can extrude tubes 12 in. diameter or smaller. Structural sections up to 14 in. across are produced from this same billet size, and by suitable die design flats and slabs for subsequent rolling can be extruded of a greater width than the container itself. These presses are widely used for breaking down alloy billets or slabs prior to finish rolling or drawing. The effect is to give a better structure and freedom from cracks.

mediately in front of the latter the frame is pierced on the central axis to form an outlet for extrusion. A one-piece frame of this kind is free from many of the troubles which lead to an assembled frame running out of alignment.

Production of tubes which are truly concentric is one of the chief problems of the extrusion process and the present design is intended to overcome the difficulties previously met with. The main cylinder and ram are arranged in the usual way except that the stroke is somewhat longer than in other designs. This allows for full

group of three pairs of auxiliary cylinders which can be operated by low pressure water. One pair constitute the pull backs for the crosshead; another pair operate the container; and the third pair, extending out at the rear end of the press, have their rams connected by a yoke and operate the mandrel which extends through the main ram and plunger for tube pressing.

The operating cycle for the press is as follows: The main ram is retracted and the heated billet is brought out of the annealing furnace by conveyor and positioned just in front of the

serted at the rear end. The container is then backed up and the plunger forces out skull and block together.

It will be seen that in these operations there is no necessity for chiseling the slug away from the die; this is a valuable feature since the tendency of aluminum alloy to weld itself to the die face is very embarrassing and leads to loss of time and damage to the tools.

Containers of various bores can be accommodated in the same hot jacket which is heated by gas or electricity. The container proper is turned with a groove near one end and is held in place in the jacket by a series of segments fitting into the groove. When a change is necessary the locking bolts and segments are removed. The jacket is then retracted and the container pushed out on to a timber platform by the main plunger.

In common with most extrusion press installations the hydraulic system consists of a battery of high speed pumps feeding compressed air accumulators; an auxiliary accumulator also serves to supply low pressure water for the idle stroke of the ram and for auxiliary purposes. This accumulator is charged on the return stroke of the main ram. In addition the Krupp press is furnished with complete electric control including automatic safety devices.

Because of the considerable weight of billets dealt with in the largest presses every possible mechanical means is used for handling them so as to reduce the time cycle per operation. In earlier designs of press the time occupied in removing slug, clearing die and container and re-charging would be many times as great as that required for the working stroke; this has been minimized by the use of conveyors for handling and positioning the hot billets from the furnace and by the simultaneous cleaning of the die and re-loading container.

Ed. Note: — Next week the author concludes this article with a description of direct, inverted, and tube extrusion; compound dies, composite metal extrusion, alloy extrusion, etc.

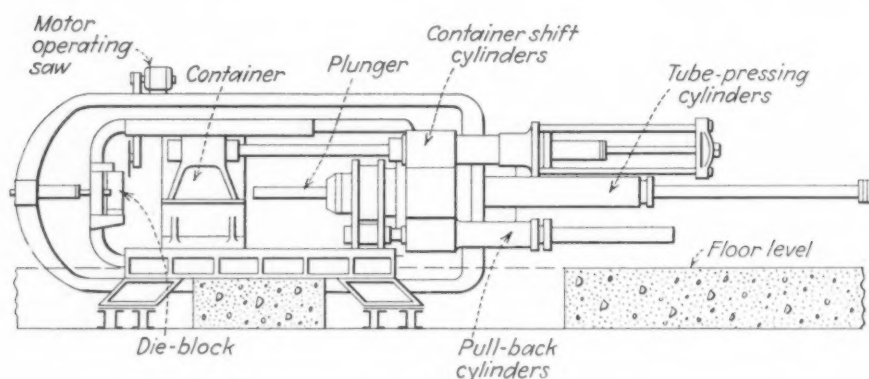


FIG. 3—Krupp type of extrusion press.

horizontal movement of the container and permits loading either at the front or rear end. Both crosshead and container travel on upper and lower guide plates, the latter being mounted on the main foundations—the movement is, therefore, always truly horizontal even if there should be a slight yield in the frame members.

The die is set in a cross block at the front end of the frame and can be inspected in place after each stroke when the container is backed off. This avoids the troublesome pushing out and resetting of the die after every operation and does away with the usual die lock and cylinder. When a change of die is necessary the cross block is pulled transversely, bringing the die opposite a small hydraulic cylinder mounted at the front of the frame; operating this pushes the die block clear out of the cross block. The main cylinder is surrounded by a

container. The latter then travels forward and is held up against the die block. A cast steel clearance pad or block is then inserted at the rear of the container and the main ram operated. The plunger travel stops when about 1 in. of the billet remains unextruded and the ram and container are then drawn back. The effect of this is to pull a few inches of section back through the die whereupon a circular saw is swung down and automatically operates to cut off the section at this point. The extruded length is then pulled through the die on to the receiving table, straightened and otherwise dealt with. In the meantime the main plunger is operated to clear the slug and pad out of the container and on to a timber covered platform. The last stage is to clean out the "skull" or skin of oxidized metal which now lines the container, and for this purpose a close fitting block is in-

By HERBERT CHASE

Cold Chamber Die Casting

—For aircraft parts in magnesium alloys, this die casting method is showing remarkable advances in technique. Similar improvements have been made in the handling of brasses, bronzes and aluminum.

MANUFACTURE of die castings by the use of "cold chamber" machines has been growing for several years and is now practiced in many plants. This procedure is the only one suitable for copper-base alloys, including brasses and bronzes, and has proved to be the only one commercially suited to the production of magnesium alloy die castings.

For the aluminum alloys, the cold chamber type of die casting is sometimes advantageous and is usually considered essential if the part be for aircraft application, although there are probably, for other applications, still many more aluminum alloy die castings made with the air injection or "gooseneck" type of machine. Relatively few die castings in zinc alloy are made on cold chamber machines as they are slower in operation than the plunger type which is commonly used for zinc. Also, they have not yet demonstrated any advantage for the zinc alloys, which have a lower melting point and can be used with a plunger which remains in continuous contact with the molten alloy. Such plungers apply as much pressure as is required for castings of adequate soundness.

Comparatively few plants devoted to die casting produce cold chamber castings from all the alloys mentioned above, but the Harvill Aircraft Die Casting Corp., Los Angeles, is an exception. As its name indicates, it is devoted chiefly to the manufacture of die castings for aircraft, although it also serves customers in other indus-

tries. This company is an exception also in that it does relatively little with the zinc alloys which, in most die casting plants, accounts for perhaps three-fourths or more of the total output. The reason lies chiefly in the demand for lighter alloys by the aircraft industry, to which the company caters. It serves most of the large aircraft producers on the West Coast, and their increasing output has taxed the capacity of the Harvill plant, which doubled its size not long ago and has just moved into much larger quarters where still more equipment is now installed.

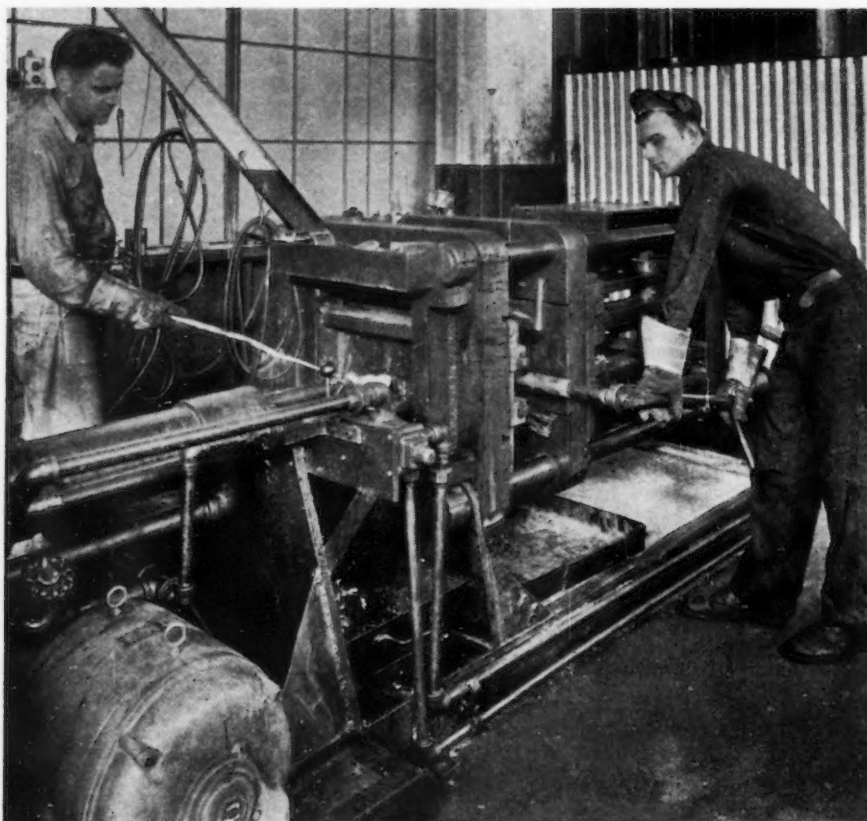
Now that aircraft designers have found how useful die castings can be and that the demands for their product has been greatly increased to meet rearming and war requirements, it has proved difficult to keep pace with orders and to build new dies as rapidly as customers would like them built and put into service. Not long ago, the use of die castings for aircraft was considered prohibitive because of the small quantities required. But with the development of methods for making dies at lower cost and of orders for much larger numbers of duplicate aircraft parts, the die casting has become almost a prime necessity for certain types of parts. Demands have further increased because of the recent adaptation of magnesium alloys to die casting and the consequent ability to make castings of still lighter weight than for the lightest aluminum alloys.

Die castings are not yet recommended for highly stressed aircraft parts, although some have been so

used. Their chief utility is for lightly stressed or virtually unstressed parts. However, die castings have displaced some sand castings and some welded stamped assemblies, often with marked savings in cost as well as a great increase in the rate of production. This is sometimes, though not always, offset by higher tooling costs (chiefly for the die required) but has been fully justified by far lower machining costs and by the release of machining equipment for other work. Although the machining of dies is often quite expensive, it can be quickly offset by lower machining and other fabricating costs of the die castings themselves as compared with those needed on the part replaced. And, once the die is made, the savings continue to mount with each repeat order for castings made in it.

During a recent visit to the Harvill plant, the author saw seven cold chamber machines in operation and was told that several more would shortly be added as soon as a new plant was ready. The machines are of Harvill design but are fairly conventional in most respects. They make use of a hydraulic toggle mechanism for locking the dies and of a hydraulic plunger for forcing metal into the dies after the metal has been ladled by hand into the "cold" chamber. The injection plunger exerts a very heavy pressure, but this seldom need exceed 12,000 lb. per sq. in., as this has been found to yield castings of required density under most conditions.

Metal is heated in pots separate from the machine and under such conditions



LADLING molten metal into the "cold chamber" of one of the high pressure die casting machines in the Harvill plant, the alloy in this instance being one based on magnesium. Operator at the right handles the ejector mechanism.

that it is normally held at or very close to its melting point and is sometimes in a semi-molten condition. From the melting pot, the metal is ladled by hand, in roughly measured quantities, into the cold chamber of the machine, after which the ram is immediately advanced, forcing the metal into the locked die. Any excess metal forms a slug, attached to the casting gate, and is broken off and remelted. The slug makes it unnecessary to measure the metal quantity exactly and is, of course, ejected from the die with the casting or gate of castings.

With magnesium, it is necessary to use a special hood over the melting pot and to apply sulphur in such a way that an atmosphere of SO_2 is formed above the metal and air excluded, to avoid possible ignition of the metal. A small amount of flux is also added, but the metal is always ladled from below the surface and its transfer to the casting machine is too rapid to permit oxide to form in detrimental quantities.

Alloys based on aluminum and on copper are similarly handled except that provision against normal exposure to the air is not required. In other respects, the die casting of aluminum and of magnesium alloys is about the same, and the same die can be used, the melting point and shrinkage

on cooling being so nearly the same that similar results are secured. Casting rates vary with the size and section thickness of the casting and with other factors. However, an average of 500 "shots" or die fillings an 8-hr. day is approximated, as a rule, even when using copper-base alloys and, of course, the die often has more than one cavity, unless the casting is quite large. Aluminum and magnesium alloys can be cast somewhat faster, partly because of their lower melting points. As dies in this plant are seldom used for more than a few hundred castings per run, casting speed is not of great importance and the cost of channeling dies for water cooling is seldom justified, normal air cooling being adequate at the casting rate commonly attained.

Because of the relatively short-run work, which is the rule for aircraft (in which quantities are small as compared with quantities ordered in the general run of die castings produced in Eastern plants) and for most other customers on the West Coast, it is necessary to minimize die costs. This is sometimes done, especially for large castings, by using chromium-nickel iron sand castings for the dies and casting the cavities therein within $\frac{1}{8}$ to $\frac{1}{4}$ in. of required size, allowing just enough extra metal for machining to a smooth finish. This has resulted

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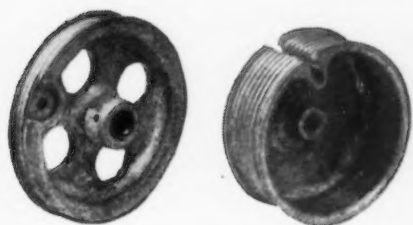
GROUP of die castings in aluminum alloy produced in cold chamber machines under much higher pressures than on the commoner air injection gooseneck machines used in many other plants for the average run of aluminum die castings.



in considerable savings in some cases. For the average die, however, the cavities are cut in slabs of chromium-vanadium steel, such as S.A.E. No. 6140, which is subsequently case hardened by boiling in a cyanide solution for a one-half hour and quenching in oil. This results in a hardened case ranging from 0.003 to 0.005 in. thick, which is adequate for the runs normally required on aluminum and mag-

in manganese-bronze, for example, are used for such parts as clevises and small angle brackets. Some of the latter are die cast in sections slightly under 1/16 in. thick, which is remarkably thin for copper-base die castings. A bracket die cast in such sections approximates in strength one fabricated by welding from mild steel and can be produced much more rapidly and at lower cost, since the

machine tools. One of the latter is a casting measuring $6\frac{3}{4} \times 6\frac{1}{8} \times 2\frac{1}{4}$ in. and having some sections $1\frac{5}{8}$ in. thick, the casting weighing about 13 lb. As against this, one of the manganese-bronze aircraft corner brackets produced in a section less than 1/16 in. thick and measuring over all about $1\frac{3}{4} \times 1\frac{3}{8} \times 1\frac{1}{4}$ in. weighs only 1 1/4 oz. Some manganese-bronze clevises weigh only 1 oz. These are not necessarily



ABOVE

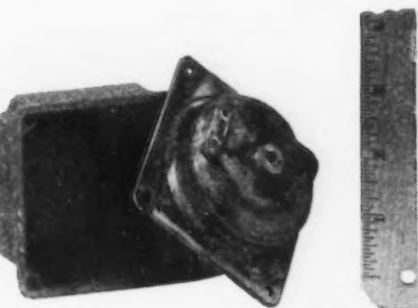
FOUR castings in magnesium alloy for use in aircraft. One pair is for a junction box about 3 in. square and 2 1/2 in. deep and weighing only 3 oz. The other pair are control pulleys in which the cable grooves are cast.

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nesium alloy castings. If much longer runs were necessary, a die steel less likely to heat check might be required.

For die casting alloys of higher melting point, however, such as bronzes and brasses, it is necessary to use dies of high-speed tool steel having about 12 per cent tungsten and 4 per cent chromium content. This steel is used also in some cases for sharp edged cores in dies for casting magnesium and aluminum alloys. Even this steel is subject to heat checking in time, at the high temperatures at which the copper-base alloys must be cast, but for the short runs that are normal in the Harvill plant it serves its purpose well, being used even for die casting aluminum-bronze alloys which have a melting point of about 1900 deg. F.

For aircraft parts, the demand is, naturally, largely for the alloys based on aluminum and magnesium in which 33,000 to 34,000 lb. per sq. in. is said to be the minimum tensile strength attained. Alloys based on copper, however, are reported to have, in some cases, a tensile strength as high as 110,000 lb. per sq. in. and a much higher elongation than the aluminum and magnesium alloys. Hence the copper-base alloys, despite their much higher gravity, find some use in aircraft parts, especially small ones. Some



BELOW

GROUP of manganese-bronze die castings, the two on the right being for a machine used in the canning industry. The large casting, upper right, has exceptional thickness of section. The star shaped part is a governor flyball retainer for a diesel engine. These castings resulted in great savings in machining and have a strength approximating that of mild wrought steel.



labor cost is small. Corrosion resistance, of course, is much higher than for carbon steel. As blanking dies for steel parts fabricated into brackets may be required and perhaps a forming die may also be necessary, the die cost for the die cast part may be little if any greater than that for the fabricated steel part.

Among the copper-base die castings produced in the Harvill plant are some for diesel engine parts and some for

the limiting sizes or weights but afford an idea as to what has been done in the copper-base alloys.

One of the largest aluminum alloy die castings yet made for aircraft use is a control pedestal, produced in two parts, using dies cast in chromium-nickel iron. When assembled, this pedestal measures $29\frac{1}{2} \times 7\frac{3}{4} \times 5$ in. and weighs 4 lb. Only 500 sets of these parts were required and, allowing \$3 per set for die amortization, the price

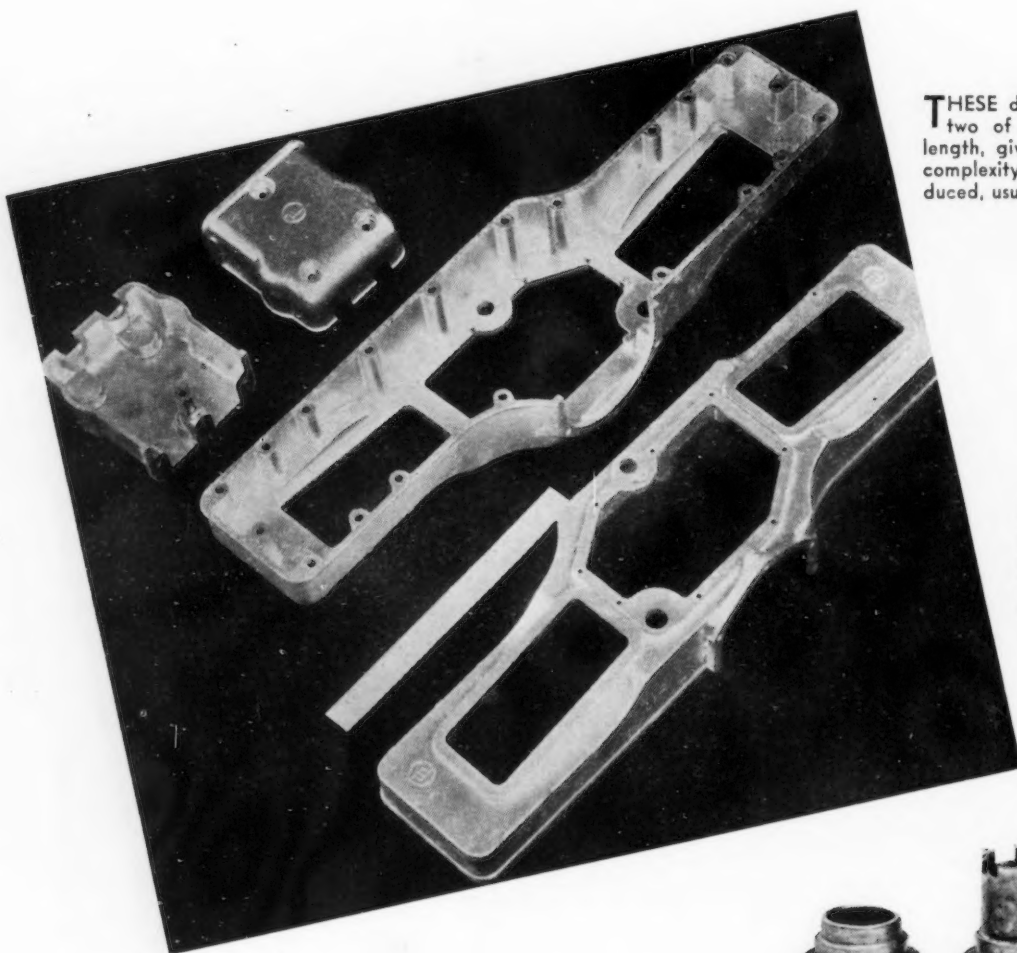
per pair, ready for assembly, with all necessary machining done, was only \$15.25. The assembly took the place of a sand casting which cost the purchaser, in unmachined form, \$8.72 including an allowance of 32c. per casting for pattern amortization. But after receipt, the purchaser had to spend 80 hr. in machining the sand casting, or \$120 per casting at \$1.50 an hour. There was thus a saving of

before shipment. This pickle retards surface corrosion and provides a good base for subsequent coats of enamel.

Aluminum die castings are produced in the largest numbers and in a great diversity of sizes and shapes. Among these is a box-like control pedestal which is $23\frac{1}{8}$ in. high, $6\frac{1}{2}$ in. wide and $4\frac{1}{4}$ in. deep. There is a longitudinal stiffening flange running most of the height and many other

shock absorber parts die cast in aluminum alloy have taken the place of welded assemblies, in one instance costing 53c. per casting as against about \$5 for the welded part displaced.

Among the many aluminum die castings are bomb-rack anchors, cable pulleys in great variety, fair lead assemblies, various brackets, air intake check valves, retaining rings for elastic stop nuts, cockpit inclosure parts, de-



LEFT

THESE die castings in aluminum alloy, two of which approximate 30 in. in length, give an idea as to the size and complexity of parts which are being produced, usually with marked savings in machining costs.

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BELOW

A SAVING of about 25 per cent over corresponding parts produced by automatic screw machine is said to have resulted when these two hydraulic valve parts were converted to aluminum alloy die castings.



over \$100 per pedestal in favor of the die casting. This, of course, is an unusual case, but shows what can be done in saving on machining costs when, if sand castings be used, they require much machining.

Among the small parts produced in magnesium alloy are junction boxes, complete with cover and involving sections about $1/16$ in. thick. (Fig. 3). Such a box about 3 in. square and with an over all height of $2\frac{1}{2}$ in., including the cover, weighs just over 3 oz. complete. Parts for bomb release mechanisms, some of which are quite complex castings of medium size, are die cast in magnesium alloy at a marked saving over similar parts in sand cast form. All magnesium alloy castings are given a chromium pickle

stiffening ribs and mounting parts. Section thickness averages about $1/8$ in., but the casting is very rigid and weighs only 5 lb. It would involve much more labor, either in machining or welding, if made from a sand casting or by fabrication of sheet metal and doubtless would cost much more in either form.

Some aluminum die castings produced weigh less than 1 oz. and have sections down to $1/16$ in. or less in thickness. Certain of them are produced at a price lower than for equivalent parts made on the screw machine and have cast threads later milled to give "Class 3" fits. Some

icing manifolds and the like. Such parts as de-icing manifolds can be made up, of course, by welding from tubing and applying end fittings, but only at high cost as compared with an aluminum manifold die cast in one piece and requiring almost no hand work or machining except for chasing threads and removing flash.

It will thus be seen that the die casting has made a deserved place for itself in the aircraft field and promises to find still more extensive use in this field as designers of aircraft parts become better acquainted with the possibilities and economies made possible by die casting.

Bright Copper

Electroplate

AN interesting paper on the electro-deposition of bright copper, by L. Greenspan, chemical engineer, New York, was discussed early in October at the Ottawa meeting of the Electrochemical Society.

It was stated that the bright copper plates obtained from various solutions heretofore proposed are not comparable in appearance with the bright nickel deposits commercially produced today. However, upon adding ammonium sulphate to the copper amine baths recommended by Brockman, bright ductile plates of copper are now being obtained. The commercial bath contains 100 gm. per liter copper sulphate crystals, 20 gm. per liter ammonium sulphate, and 80 cc. per liter diethylene triamine.

The use of amines in plating solutions was first recorded in the literature in a patent issued to R. H. Atkinson (1,981,715). C. J. Brockman and his co-workers, originally motivated by the notable desire to eliminate poisonous cyanide solutions, published a number of papers describing the use of various amines such as the ethanol amines and the ethylene amines in the electrodeposition of copper. Their results were interesting in that they showed that cathode efficiencies approaching 100 per cent could be obtained with many of these amines, and that semi-bright plates could be produced. Investigations carried on by Mr. Greenspan showed that the deposits from these solutions were invariably brittle and the bright throwing range (that is, the range of current densities over which bright plate could be obtained) was poor. The fact that the plates were brittle was enough to make them useless from a commercial standpoint, according to Mr. Greenspan.

After considerable preliminary work it was discovered that free ammonia exerts a specific effect in overcoming brittleness and ammonium sulphate, by

virtue of its buffer action, is required for producing uniformly bright plate. Two solutions were investigated, one containing a comparatively high metal and one a low metal content. The optimum concentrations are given in the table below:

	High Metal gm. per liter	Low Metal gm. per liter
$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$	100	50
Diethylene triamine	80	45
Ammonium sulphate	20	40

In comparing these solutions it is interesting to observe that as the metal content is decreased, the amount of ammonium sulphate has to be increased in an inverse ratio. Other amines of the ethylene series may be used in place of diethylene triamine, such as triethylene tetramine, tetraethylene pentamine, hydroxyethyl ethylene diamine, etc., with excellent results. Ethylene diamine may also be used but, because of its being comparatively volatile, is not to be recommended.

An installation of the high metal bath was made in the plant of a large manufacturer in the Middle West. This solution has been in operation on a commercial scale for about a year and a half, according to Mr. Greenspan. It is run at a temperature of 60 deg. C. Agitation is provided by means of a moving cathode bar arrangement. Occasional filtration, about once a month, has been found sufficient to keep the solution free from suspended matter. An average current density of 40 amp. per sq. ft. (4.3 amp. per sq.dm.) is

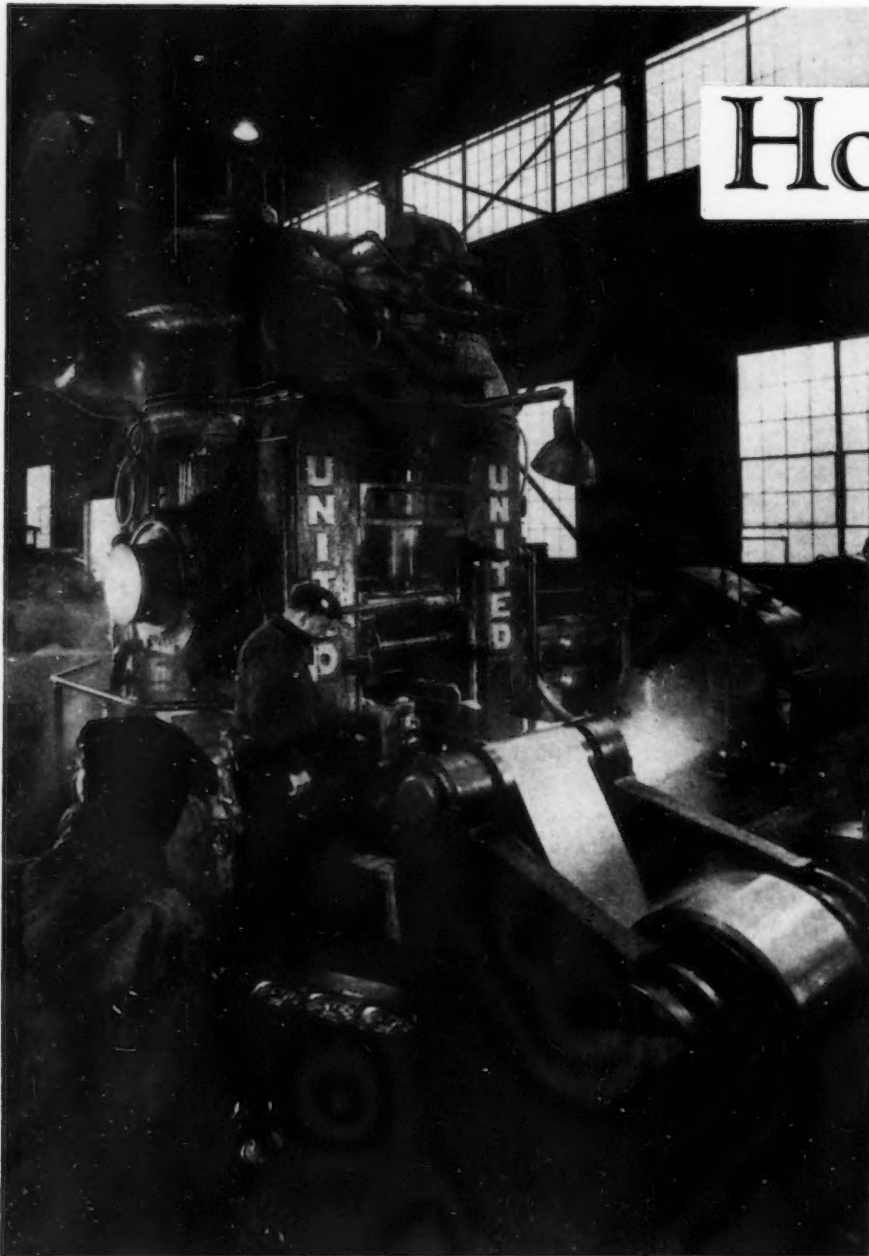
employed and on some articles current densities as high as 130 amp. per sq. ft. (11 amp. per sq. dm.) have been used with excellent results. As mentioned previously, ammonia is lost by evaporation and must be replaced to maintain the brightness and ductility of the deposit. In commercial operation it has been found that additions of 3 to 5 cc. per liter per day of concentrated aqua ammonia is sufficient to take care of losses. One addition at the start of the day is sufficient to keep the bath in operation for the remainder of the day.

Small amounts of iron in the solution tend to cause pitting, so that rubber-lined equipment is recommended. Certain organic impurities of undetermined nature will cause dullness in some cases and pitting in others or both. These impurities can readily be removed by treating the solution with activated carbon. Iron is removed easily by filtration because of the insolubility of its basic compounds.

It has been found that reducing the surface tension by the use of a suitable wetting agent will eliminate to a great extent pitting caused by impurities. Sulphate esters of certain secondary higher alcohols such as "tergitol-08" have proved very effective.

In plating zinc die castings and steel it is necessary to flash the articles to be plated in a copper cyanide solution. Although this step may be considered part of the cleaning operation, Mr. Greenspan is at present working along lines to eliminate this procedure. After applying the proper thickness of deposit, the work is then put through a bright nickel solution and then topped off with chromium plate. Thus intermediate buffing operations are completely eliminated.

Regarding the anodes, rolled electrolytic copper is used and sufficient anodes are placed in the tank so that the anodic current density does not exceed 15 amp. per sq. ft. (1.7 amp. per sq. dm.).



How Good

SOMETIMES a fine surface that has been expensive to generate gives poorer results than a rougher one. In some steel mills the rolls used for finely finished steel would give improved performance if the surface were rougher.

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A MANUFACTURER of aircraft motor parts recently consulted with the Carborundum Co. on the problem of securing a very fine finish on a part, commercially and cheaply. He insisted that the surface must have a roughness of less than 1 micro-in. r.m.s., if it were to pass inspection by the buyer. Such a surface was secured by dint of a heavy investment in special machines and by the use of special abrasives.

Later, in conversation with the buyer's chief engineer, he said that inasmuch as the part had a very limited movement in the engine, no such finish was needed. All his inspectors re-

quired was a surface roughness of not more than 13 micro-in.

Doubtless the parts manufacturer was supplying the unnecessarily fine surface primarily in order to have an edge on his competitors—a very common practice. Actually, the saving from supplying the 13 micro-inch surface, if reflected in the price, would probably have been a much more potent competitive weapon.

Few American manufacturers make the mistake of furnishing too poor a surface. The only exceptions that have come to the writer's attention in recent years are a few machinery manufacturers who hold to the old belief that some roughness and waviness is needed in bearing surfaces in order to provide reservoirs in the surface. Otherwise, the theory is, the oil will not be able to reach the actual bearing area.

This was very likely a natural mistake 30 years or so ago when little was known about what actually goes on between bearing surfaces and an oil film. It is known now that such hollows in a bearing surface are not only unnecessary but undesirable.

If the theory were true, the logical procedure with a new automobile would be to run it for 500 miles, until the engine bearings are worn smooth, then tear it down and roughen up the bearings to get proper lubrication. This of course is ridiculous. It is known that the "breaking-in," or "running-in" period is in effect a slow and unscientific lapping process which wears down the high places in the bearings. Automobile makers have determined what the final surface quality of the bearings should be, based largely upon the known ultimate wear of rough bearing surfaces. Most automobiles are now provided with bearings finished to that quality, so that the running-in period is not necessary.

But there are still some machinery manufacturers who cling to the old theory. They are about the only ones who regularly provide poorer surfaces than are desirable.

* See The Iron Age, issues of Oct. 5, 1939, p. 48; Aug. 10, 1939, p. 75; May 18, 1939, p. 78; March 23, 1939, p. 50.

Should a Surface Be?

But, on the other hand, it is undoubtedly true that many millions of dollars are wasted by supplying better surfaces than are needed. The principal reasons for this are: (1) beating competition—which has already been mentioned; (2) uncertainty, or disagreement, as to how good a surface is needed for a given purpose; and (3) loose phraseology in describing the type of surface.

It would be an excellent thing if the engineers, designers, production men and sales managers of both suppliers and buyers could get together and set standards for surface roughness and finish for all types of product and service. The standards should be set at the cheapest usable surface for the purpose.

At present the only guide is observation and trial. But most designers are distrustful of such methods and, to be on the safe side, tend to specify surfaces somewhat better than are needed, apparently forgetting that it is *much easier to specify a fine surface than to develop it.*

It is not always true that the better the surface the better the performance. *Sometimes a fine surface that has been expensive to generate gives poorer results than a rougher one.* Here is an example.

The grinding department of a steel mill became enamored of ultra finish for rolls—a surface that is essential for giving a fine finish to cold rolled steel. The grinding operators carried this obsession over into the grinding of breaking-down rolls, and by expending much time and running up the costs, secured an ultra finish of 1.5 micro-in.

In operation it was found that this surface did not supply sufficient traction. A rougher finish—one of 10 micro-in.—produced a roll of sufficiently good surface that gave much better performance, at much less cost.

Until recently there has been no way to specify surface quality scientifically. Each shop had certain pet terms for describing the surfaces and finishes which it produced. The more com-

monly used expressions were "commercial," "rough commercial," "good commercial," "rough," "reflecting," "high," "ultra," "lapped" and "high luster."

These did not represent definite mathematical measurements of the surfaces, but depended upon appearance, reflecting ability, or such crude tests

° ° °

By H. J. WILLS

Engineer, Carborundum Co.,
Niagara Falls, N. Y.

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as rubbing the finger-nail across the surface.

Difficulties frequently arose between buyers and sellers because they meant entirely different things by the same description. Thus an assembler of a certain type of machinery specified that his suppliers provide certain parts with what he called a "mirror" finish. When translated into micro-inch r.m.s. values it was found that what he wanted was a much rougher surface—one of 35 micro-in.

On the other hand, another shop specified that certain parts purchased on the outside have a "commercial" surface. Now, to the supplier a commercial surface meant one of about 40 micro-in. roughness. What the consumer needed, and what he thought he was ordering, when he specified commercial surface was one of a roughness of not more than 2 micro-inches.

These cases are typical of the chaos that exists pretty well throughout the metal working industry—and which will continue until the present loose phraseology is discarded and the modern specification of surface roughness by r.m.s. values in micro-inches is generally adopted.

The root mean square (r.m.s.) method of describing surface roughness was worked out by a Committee for the Standardization of Classifica-

tion of Surface Roughness under the sponsorship of the A.S.M.E. and the S.A.E.*

There are several devices which enable surfaces to be measured in these units. One of them gives direct readings in micro-inches r.m.s. Another provides an oscillogram which can be measured and from which simple arithmetical calculations will give the value in micro-inches r.m.s.

Now, to become more specific as to how good a surface should be. The safe statement would be something like this: "A surface should be good enough but no better than necessary." But that does not throw much light on the subject. So with the understanding that the writer does not claim that they are hard and fast standards, or that they are even generally accepted throughout the metal working industry, the following roughness values, in r.m.s. micro-inches, are offered as those found most widely accepted by makers and buyers of the parts listed.

Part	r.m.s values in micro-in.
Automotive valve stems....	3
Automotive cylinder bores..	3 to 7
Automotive piston pins....	1
Tappet faces	2
Tappet barrels	3
Crank pins	3 to 4
Plug gages	0.4 to 0.7
Roll bearing faces.....	1 to 2
Camshafts	4 to 6.
Armature shafts	2 to 3
Railroad car axles.....	2 to 7
Automotive pistons	2 to 4
Hot mill rolls (continuous).	10 to 15
Cold mill rolls (continuous)	4 to 7
Temper mill rolls.....	1 to 3
High finish strip.....	0.5 to 1
Steckel mill rolls.....	0.5 to 1
Back-up rolls.....	10 to 20

These values should give the engineer and designer merely an indication of what has been found to be general good practice in a wide variety of shops—where they have undertaken to learn just how good a surface should be, and have expressed their convictions in the currently used mathematical notation.

Heat Treating

—Mower knives hot formed into a double spiral in a hydraulic fixture, then hardened automatically.

ONE of the major problems in the power golf mower industry, during its rapid development in the past 20 years, has been the difficulty in maintaining wear life for the grass cutting parts of the mower.

Twenty years or so ago most estate and golf course mowers were powered by a horse, usually a family pensioned pet. The revolving cylinder, which in a mower carries the spiral knives that operate in conjunction with a fixed stationary bed knife to cut the grass, did not operate at high speeds. The mower itself journeyed, during a not too hot day, perhaps 6 to 8 miles. Stresses, balance, wear and fabrication were not the first thoughts. Does it cut, was problem enough!

With the evolution of gang mowers,

a 60 hp. tractor now draws an assembly of units. The swath cut is over 15 ft. wide, and a modern unit will travel 40 miles in a single day's work. The revolving cylinder, as its burden became greater, required increasing study. Weighing 45 lb., spinning 1500 to 2000 r.p.m., carrying alloy steel blades welded to a rigid spider and shaft, the cylinder has become a fine development in mechanics.

The 30-in. cutting knives, fixed on the cylinder, due to their spiral shape and the desirability of retaining exact uniformity in shape for stress reasons of assembly and operation, have been awkward heat treating objects, either when handled singly or when the entire mounted cylinder has been hardened and tempered.

Recently, J. I. Blair, chief engineer Worthington Mower Co., Stroudsburg, Pa., developed an extremely practical piece of combination bending and heat treating equipment to produce these knives. Not only is the spiral knife formed, and in the case of the Worthington blade a double spiral, but the knife is quenched in oil during a continuous operation.

Fig. 1 shows a cross-section of the blade, and Fig. 2 shows the formed blade together with an assembled mower unit. Fig. 3 shows the hot straight blade in place in the hydraulic forming machine, upright and parallel with the radical center line of the mandrel. It is ready to be bent.

A hydraulic ram, actuated from a small high pressure hydraulic pump

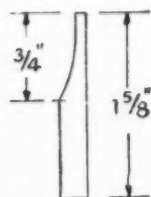


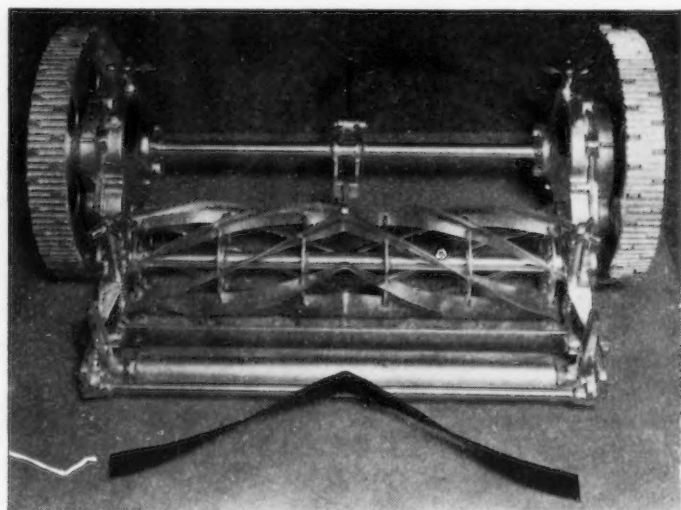
FIG. 1 — The knife section is a special heat treated, oil tempered alloy steel with a minimum Rockwell hardness of 40 C.

• • •

RIGHT

FIG. 2—The formed and hardened blade is shown in the foreground, and the completely assembled mower unit is behind.

• • •



mounted and driven by an electric motor placed at the rear, turns the idle disks until they engage with the fixed disks. Here the blade is definitely formed, held under pressure, and with the thin edge exposed is ready to be quenched into the oil beneath. (See Fig. 4).

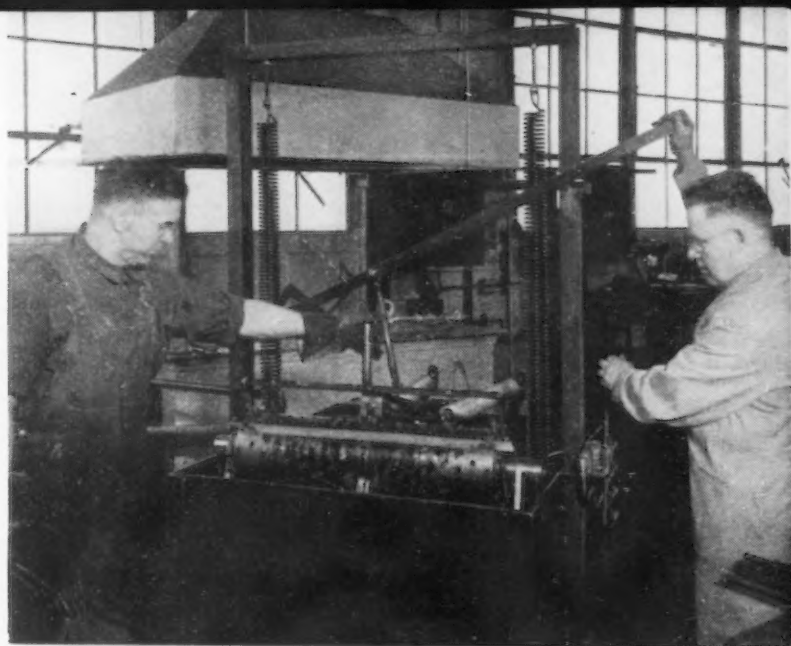
The forming-quenching fixture is suspended and hinged over the quenching oil. The two long vertical balance springs in the rear take the weight of the fixture so that it will practically float in quenching oil when the latch lever is released by the operator on the right, after blade is formed.

The blade is held in the formed position, under full pressure, while being quenched in the oil tank beneath the forming fixture, as shown in Fig. 5. The operator imparts motion to the fixture to insure full quenching, allows the handle to snap back and latch up, as in Fig. 3. The pressure is released on the ram by turning the control handle. Large retracting springs draw the ram back onto the starting position.

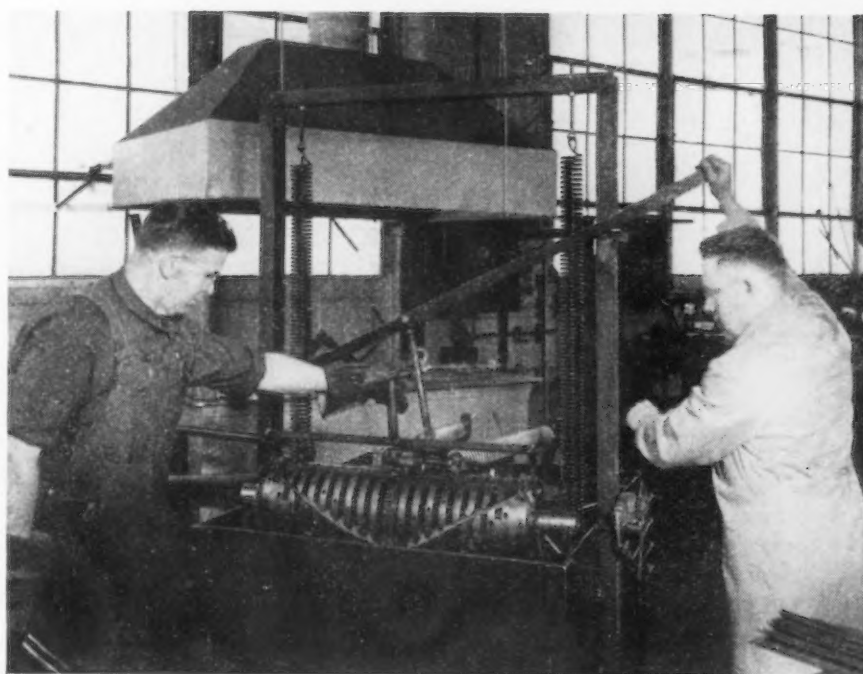
The cycle for the complete operation is less than 45 sec. and the quality of the blade produced by the method is gratifying, especially from the consideration of uniformity in curvature of the blades and similarity in shape of one blade to another.

A Cr-Mo steel made to narrow hardenability specifications, by Henry Disston & Sons Co., Philadelphia, is used in these knives. The hardness obtained after quenching is within two points Rockwell C scale, taken from production runs.

FIG. 3 — Here the straight blade is inserted in the hydraulic forming and quenching unit. The cams on the machine may be regulated to give various types of spirals.



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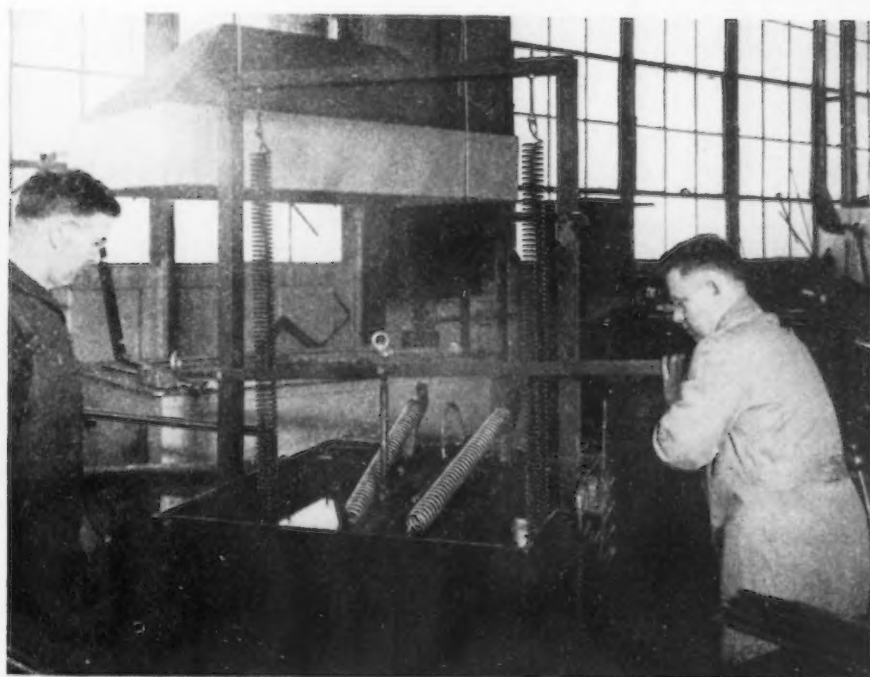
ABOVE

FIG. 4 — The hydraulic mechanism is set in motion, and the top cams force the blade against the lower stationary cams, the blade thus being formed into a double spiral.

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LEFT

FIG. 5 — Here the entire fixture has been dropped into the oil bath to quench the blade. From here, the springs draw the fixture back to its original position to receive another blade.



Industrial Controlled Atmospheres

By NORBERT K. KOEBEL*

LAST week the author described methods of determining the efficiency of controlled atmospheres, and the air-gas ratio method of controlled atmospheres. Herein, in the second section of this four-part article, attention is directed to pack hardening, atmosphere produced by carbonaceous muffle blocks, atmosphere produced by cracking liquid hydrocarbons, theory of a good atmosphere, etc.

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PACK HARDENING: Because of the shortcomings of the atmosphere on gas-fired, open hearth furnaces or electric furnaces equipped with the air-gas ratio atmosphere control, pack hardening in either charcoal or cast iron chips has been resorted to for the scale-free and decarburization-free hardening of steels between 1600 deg. and 2000 deg. F., especially the high carbon-high chromium

types. Occasionally this method is used for hardening steels below 1600 deg. F., especially when scale must be avoided and the proper furnace is not obtainable. Packing is also very useful for the annealing of high carbon and tool steels to prevent scaling and decarburization, particularly for hardened tools and dies that have been finished to the final dimension; in such cases the avoidance of any scale or decarburization in the annealing for repairs becomes of paramount importance.

The hardening of very small parts sometimes becomes quite difficult because the parts do not have enough mass to hold the heat until they strike the quench. Such small parts can be successfully hardened by packing in a small container with charcoal or cast iron chips. When the pack reaches the hardening temperature, the cover can be removed and the pack can be turned upside down directly over the quench tank, quenching both the parts and the charcoal or cast iron chips. This method is useful for occasional, small lots but is not so well adapted to production work. Care should be taken when quenching so as not to get burnt by the flash produced when the hot charcoal strikes the oil. For this reason it is best to use cast iron chips

or a small container having a volume not over 125 cu. in. When using charcoal for pack hardening, the best results are obtained from a 9x18 mesh, retort type. The cover on the container should fit fairly tight, but not so tight that it is impossible to pry it off for quenching. No cover at all or a loosely fitting cover will not suffice; the author has experienced decarburization caused by such methods.

The results of pack hardening in charcoal on various high carbon and tool steels are shown in Fig. 7. These results show that carburization occurs on high-carbon and medium-carbon tool steels having a hardening temperature above 1700 deg. F., while a very slight amount of decarburization occurs on high carbon steels at 1500 deg. F.

Although pack hardening has saved the day and many a tool, especially high carbon-high chromium steels, the method is not so well adapted to the present day requirements of the modern tool room which now uses alloy steels hardening from 1500 to 1875 deg. F. to a greater extent than the straight-carbon, water-hardening type. The disadvantages of pack hardening are that: first, more time is required to heat a tool or die, thus cutting down the number of tools that can be hardened per day and holding up the tool schedule; second, the heat treater cannot see the tool and must guess when it is up to the hardening temperature; third, a pack is inconvenient, awkward, and messy to handle; fourth, carburization may occur on certain types of tool steels to an extent that will cause early failures due to chipping and fatigue cracks.

Carbonaceous Muffle Blocks

A patented, carbonaceous, muffle block method of producing a protective atmosphere has been used during the past years and is being used very successfully today for the hardening of high speed steels. In operation, the carbon block, supported by a silicon carbide muffle, is placed in the furnace and brought up to the hardening temperature. The steel to be hardened is placed on a refractory tray inside the carbon block. The best hardening results and the maximum life of the block are obtained by closing the opened end by a piece of refractory material or a piece of an old carbon block that has deteriorated or been burnt down to such an extent that it can no longer be of use for hardening. The air in the block reacts with the carbon to produce the protective atmosphere. Although special fur-

*This article written while metallurgist at Eastman Kodak Co. Mr. Koebel is now in charge of research, development and technical problems at Lindberg Engineering Co.

naces are built for these blocks, excellent results can be obtained by their use in any furnace—a feature making it possible for a tool room to use its present or out-of-date equipment and still be able to obtain excellent results.

The chemical analysis of the atmosphere produced in the block depends upon the hardening temperature. The chief components of the atmosphere will be CO and N₂ with varying amounts of CO₂ and slight traces of H₂ and CH₄. The percentage of CO₂ or the $\frac{CO_2}{CO}$ ratio depends upon the temperature which controls the equilibrium in the reaction, $CO_2 + C \rightarrow 2CO$. At the hardening temperatures for high speed steels, 2225 to 2400 deg. F., the composition of the atmosphere will approach very closely the theoretical composition of 34 per cent CO—66 per cent N₂ obtained by the combustion of carbon with air. At this temperature there will be only very small traces of CO₂, H₂, or CH₄. At lower temperatures the percentage of CO₂ increases. The blocks are not effective below a temperature of 1700 deg. F., because the $\frac{CO_2}{CO}$ ratio becomes so great that decarburization takes place.

The results obtained by heat treating tool steels in a carbonaceous muffle block are shown in Fig. 8. These results show that any high-speed steel can be heat treated free from decarburization even when soaked for 45 min. at the hardening temperature—ten times longer than necessary for the size of the samples heat treated. All the types of high-speed steels tested were hardened scale-free and the knife sharp edges of the samples remained such even after the 45-min. soak. The only change occurring was a very slight amount of carburization, probably more of an asset than a detriment to a cutting tool, particularly those that cannot be ground after hardening and thus must be totally free from decarburization and grain growth resulting from such. The results of Fig. 8 also show that the high carbon-high chromium steels can also be heat treated in this type of atmosphere free from decarburization and scale. Whenever tools made of this steel will fit into the carbon block, this method of hardening is much preferred over pack hardening. The curves of various other tool steels having hardening temperatures below 1700 deg. F. show that decarburization takes place to some extent and that the carbon blocks are not effective in this tem-

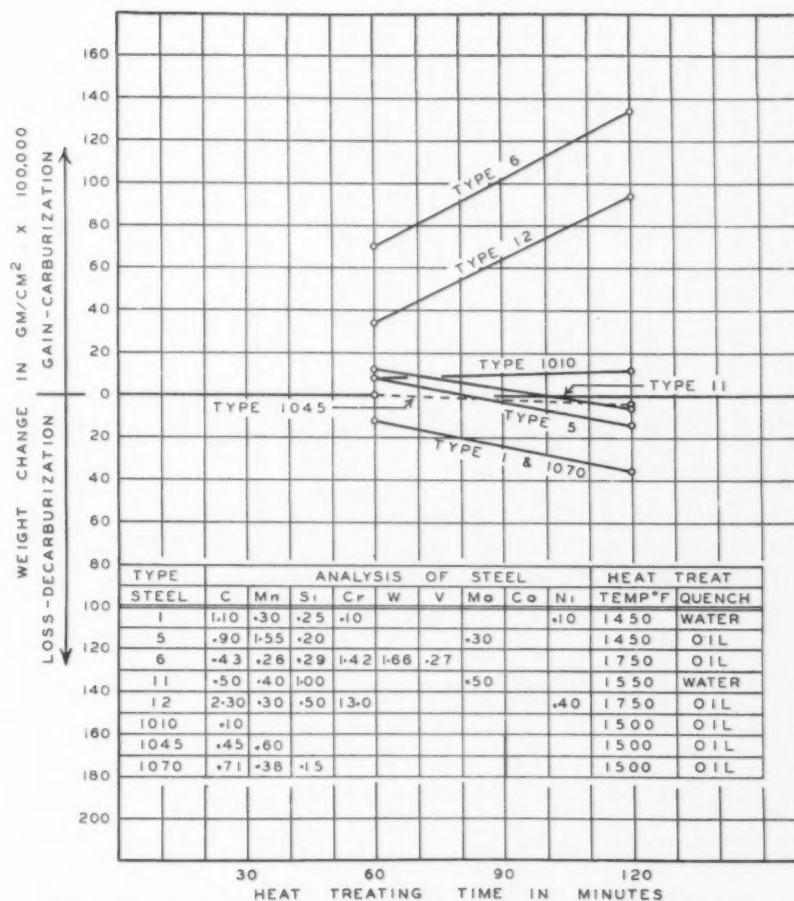


Fig. 7—Results obtained by charcoal pack hardening tool and plain carbon steels.

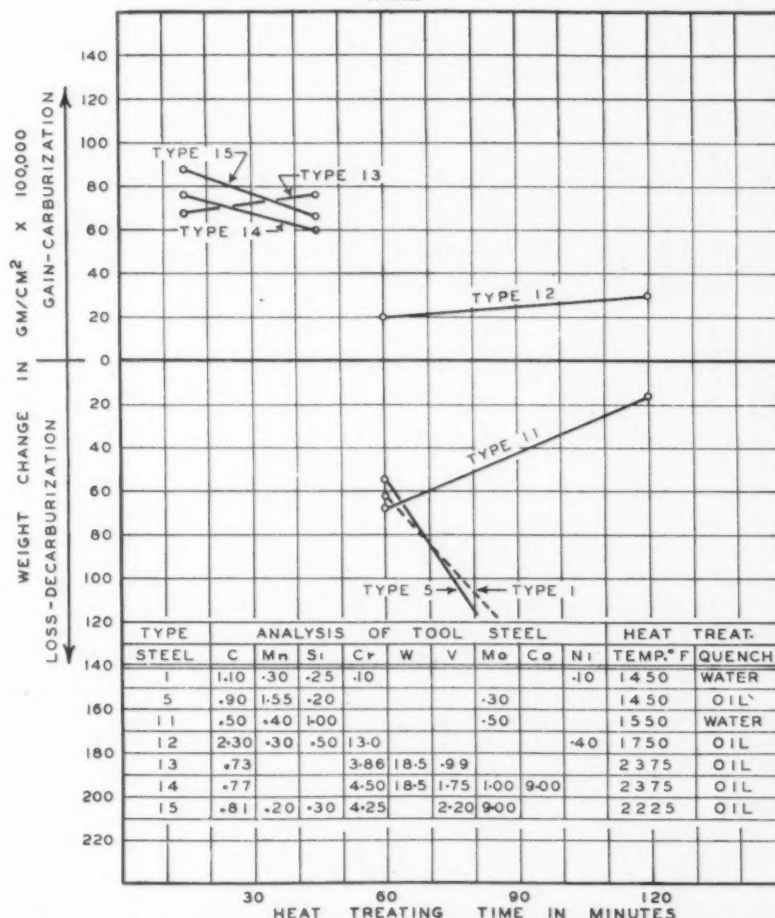


Fig. 8—Results obtained by hardening tool steels in an atmosphere produced by carbonaceous muffle blocks.

perature range even though scale-free hardening can be accomplished.

In using the carbon block method for hardening high speed steels, caution should be exercised if preheating is employed in some other furnace or atmosphere. As it was pointed out earlier in this article, very bad decarburization can take place on high-speed steels at temperatures as low as 1300 deg. F. The safest method and that employed by the author is to

available today that can accomplish this feat on any type of high speed steel regardless of the length of time or soak at the hardening temperature. The modern atmospheres put on the market in the last few years, although 100 per cent better than the air-gas ratio type, only approach the results obtained by the carbon block atmosphere.

The disadvantages in the use of the carbon block method are: first, the

low initial cost of the hardening furnace, the amount of high-speed steel that can be hardened in an hour, and the quality of the work, the cost compared on an hourly basis with other atmospheres is within reason for small tools.

Liquid Hydrocarbons

Several types of furnaces have been on the market for quite a few years that obtain the heat treating atmos-

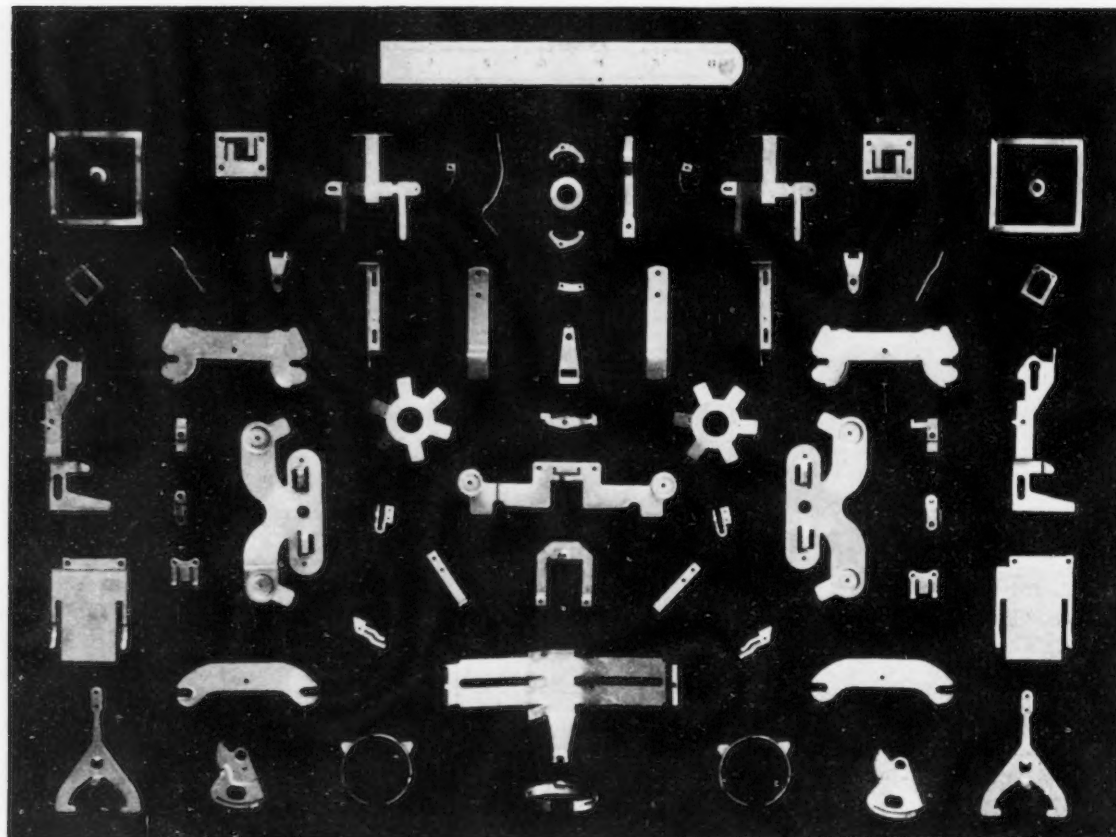


FIG. 9 — Stampings made of annealed high carbon steel sheet require hardening in an atmosphere that will prevent scaling, decarburization, carburization for performance requirements.

eliminate preheating above 1000 deg. F. The tool to be hardened should be warmed on top of the furnace, or better yet, warmed in the tempering furnace to any temperature under 1000 deg. F. and then placed in the carbon block at the hardening temperature. To prevent excessive carburization the tool should always be placed on a refractory tray and should never be allowed to come into contact with the carbon block.

The hardening of high speed steels by the carbon block method has the advantage of being a fool-proof method for hardening any type of high-speed steel free from decarburization, scale, or excessive carburization. This advantage makes it particularly useful in hardening high-speed tools that cannot be ground after hardening and must be hardened free from decarburization. This is the only atmosphere

limitation in the size of the tools that can be hardened; and second, the cost of hardening, especially for large size tools, over other atmosphere methods. The largest inside dimensions of a standard size block are $3\frac{1}{8}$ in. high, $3\frac{1}{2}$ in. wide, and either 10 in., 16 in., or 28 in. long with an approximate price per block of \$7.55, \$11.95, and \$23.70, respectively, for the various lengths. The 10-in. length is most commonly used. The smallest standard block made has inside dimensions of $\frac{9}{16}$ in. high; $3\frac{3}{4}$ in. wide and about 6 in. long at a price of approximately \$3.10 each. The average life of a 10-in. length block at a temperature of 2350 deg. F. is from 2 to 3 days' continuous use or about 16 to 24 hr. service. This makes the cost of the atmosphere about 15c. to 40c. per hr. depending on the size of the block used. Taking into consideration the

phere by cracking a hydrocarbon oil such as benzol, dipentene, or a related chemical in that series. These furnaces are of two types: in one the oil is cracked in a separate unit so as to deposit most of the soot there and allowing only the H_2 , CH_4 , CO , and CO_2 gas to enter the furnace chamber; in the other type, the oil is dripped directly into the furnace chamber where the cracking takes place. The first type is used chiefly for the heat treatment of tools, and the second type is used primarily for carburizing. Both, however, under usual operating conditions, are carburizing atmospheres.

The carburizing tendency of the gas formed by cracking the oil depends upon the type of oil used, the quantity or number of drops of oil used per minute, the steel, and, of course, the temperature. Tool steels having hardening temperatures above 1600 deg. F.

usually become definitely carburized unless the number of drops of oil per minute is cut down very low. If the flow of oil is too low, it is very possible to decarburize and scale the tool. The proper adjustment for different types of steels is usually obtained through experience in operating the unit. The performance of the unit is not entirely foolproof. Occasionally the cracking unit becomes sooted to such a degree that the flow of gas to the furnace is entirely stopped. This sometimes happens while a tool is being hardened even though precautions are taken to guard against it, such as frequent cleanings.

When the high carbon-high chromium tool steels became popular, the above atmosphere equipment was introduced as a means for hardening these steels free from decarburization and scale without the necessity of packing in charcoal or cast iron chips. Good results were obtained, and this atmosphere became very popular for the heat treatment of tools, and it was not until the last few years that equally good or better atmospheres were developed for this work. The equipment and atmosphere is not so well adapted to production work on high carbon steels and should be applied to tool steels only in cases where a carburized surface is acceptable.

Necessity for Better Atmosphere

An atmosphere that will bright or clean harden high-carbon steels without decarburization or carburization is very essential to the performance and endurance of springs or other parts which in operation have their maximum stresses concentrated on the outer edges. Such hardening is of the utmost importance for the successful and proper performance of thin spring stampings ranging in thickness from 0.005 in. upward, as shown in Fig. 9. A slight amount of decarburization will not only reduce the life of the spring, but will also greatly affect its tension. A carburized surface is equally as bad; fatigue cracks develop in a short time causing failures. Bright or clean hardening of thin spring parts is essential from several points of view. In the first place, scaling reduces the thickness of the spring thus causing a loss in tension or rigidity. On spring parts, ranging from 0.005 in. to 0.020 in. thickness, a scale from 0.001 in. to 0.002 in. thick may cause a reduction in spring tension from 20 to 40 per cent. Secondly, the scale must be removed from such parts by pickling. This usually causes hydrogen embrittlement making is necessary for an additional baking or tempering opera-

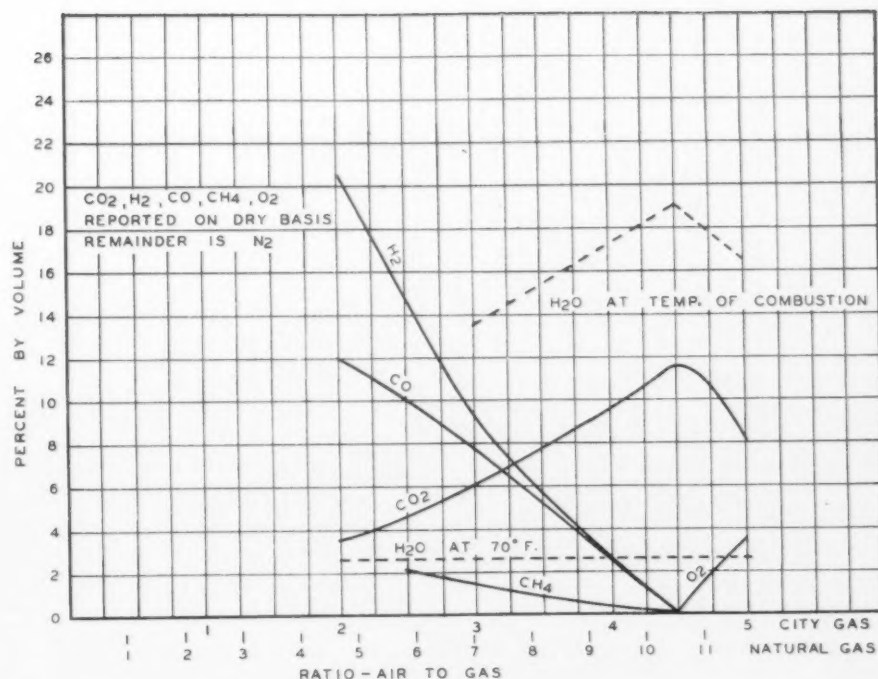


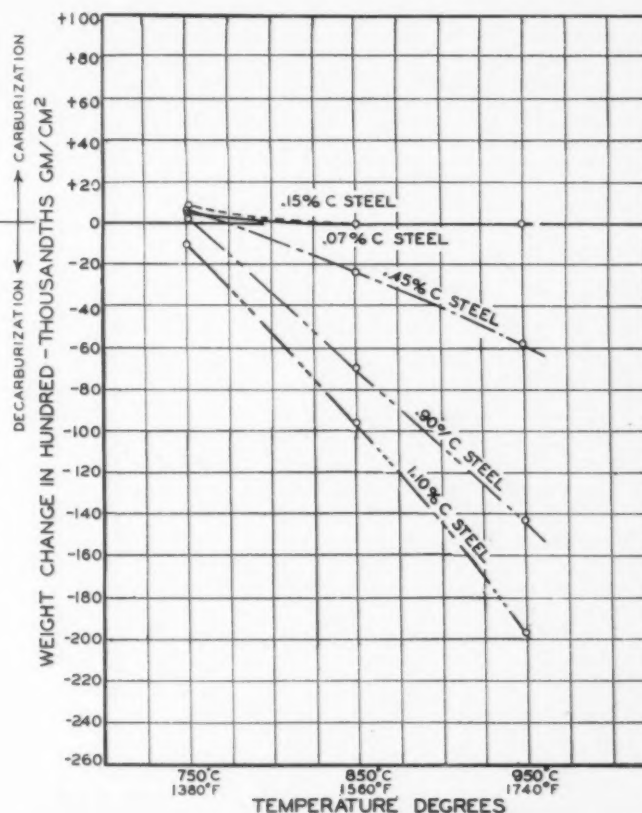
FIG. 10—Approximate analysis of gas obtained by the combustion of city or natural gas with air.

tion to overcome this effect. Selective or uneven pickling usually takes place if a portion of the scale "jumps" off while the steel is quenched and the remaining scale stays intact. A selective pickled surface causing etching is not only detrimental to the life of the spring, but also to the appearance on parts that are plated or lacquered fin-

ished for decorative purposes, as well as for performance. An atmosphere that causes a sooted surface is even more detrimental in respect to pickling, and selective pickling almost always results.

Everyone connected with tool design, tool making, or tool hardening has long realized the advantages and

FIG. 11—Effect of temperature with a commercial atmosphere (dried 6.5 CO₂—6.5 CO—9.5 H₂—77.5 N₂) on steels for 1 hr. Shows very little change with increase of temperature on low carbon steels but greatly increased decarburization with increase of temperature on medium and high carbon steels.



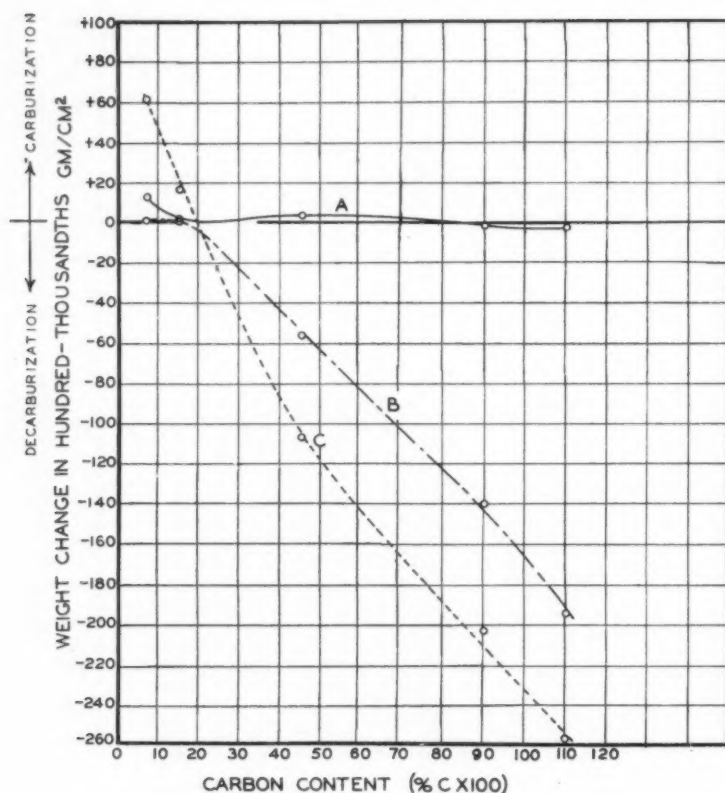


FIG. 12—Results of heat treating steels in various atmospheres at 950 deg. C. (1740 deg. F.) for 1 hr. (Koebl¹²). A = 34 per cent CO—66 N₂ atmosphere; B = commercial atmosphere, 6.5 CO₂—6.5 CO—9.5 H₂—77.5 N₂; C = gas producer atmosphere, 2 per cent CO₂—31 CO—1 H₂—0.6 CH₄—65 N₂ plus impurities. This shows that the commercial atmosphere is slightly better for a 0.07 per cent C steel; that the 34 CO—66 N₂ is much superior for steels above 0.15 C; and that unpurified producer gas is unsatisfactory for any steel.

savings in tool cost if a foolproof atmosphere could be obtained for the bright or clean hardening of any type of tool steel free from decarburization

or carburization. Decarburization is the most harmful and most dreaded evil in the hardening of tools and dies. If the tool is of a design that will

permit grinding on all the working faces, allowances of extra stock can be made and all the decarburization ground off after the hardening. Grinding, however, is an expensive operation and as much as several days to several weeks cost in labor can be saved if decarburization is avoided. Many tools and dies are of such a design that will not permit grinding on all the working faces. In these cases an atmosphere that will permit scale-free and clean hardening free from decarburization or carburization is essential. If a tool cannot be ground after hardening, then the working faces must be stoned, lapped, or polished by hand. Such hand operations are slow, tedious, and expensive, and an atmosphere that will prevent any scaling, pitting, or decarburization will greatly reduce the tool cost.

Perhaps, the greatest cost due to decarburization is for tool repairs, especially when the toolroom or hardener does not realize that decarburization has taken place and releases the tool for production service. This usually happens because the hardener or tool men do not recognize decarburization by the hardness tester unless the surface is totally decarburized so as to show a very low reading. If a steel is capable of hardening up to 65 to 67C on the quench and a reading of only 62 to 63 is actually obtained, many hardeners pass this as good enough and give it a lower draw temperature to end up with the desired or specified Rockwell hardness of 61 to 62C. Such tools will give a lower production run per grind than a tool heat treated totally free from decarburization. This causes delays in production and increased cost in tool repairs for grinding. Grinding the top surface of a die or punch merely sharpens the tool edge and does not remove the harmful effects of decarburization which will still exist on the sides of the die and punch and consequently on the cutting edge.

On some types of tools, carburization may be as bad as decarburization in causing tool failures, low production runs and high tool repair costs. Carburization leads to early failures by causing fatigue cracks and chipping. Another bad feature about a carburized tool is that the hardener must use a higher drawing temperature in order to meet a specified Rockwell hardness. After the tool goes into production service and receives several subsequent grinding operations, the carburized surface is removed, and it is found that the basic tool steel has been overdrawn and that the tool is too soft for continued use.

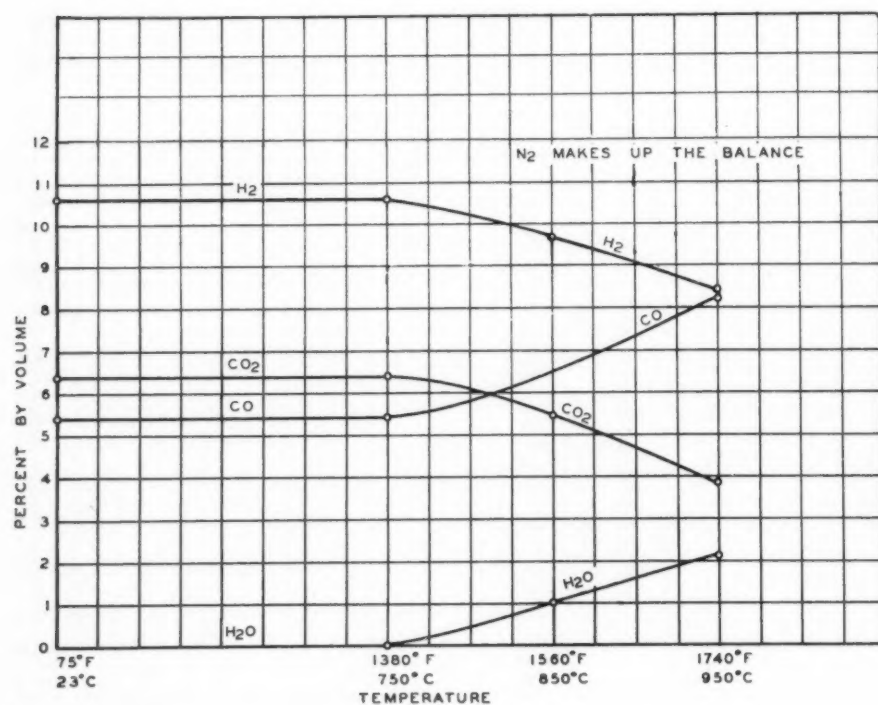


FIG. 13—Interaction of the components of a gaseous atmosphere at various temperatures.

An atmosphere permitting bright hardening without decarburization would also be useful in cases where one desires to copper braze high carbon steel parts. Atmospheres now used for copper brazing are highly decarburizing to high carbon steels, and such parts must be protected by copper plating to prevent excessive decarburization.

Theory of a Good Atmosphere

Attempts were first made to obtain bright or scale-free hardening on high carbon and tool steels by using the air-gas ratio atmosphere generator which was successfully being applied to the bright annealing of low carbon sheet and strip steels. The range in composition of the gas obtained by various air-gas ratios can be seen by referring to Fig. 10. The only difference in this air-gas ratio atmosphere and the method described for tool room furnaces is that the cracking or combustion unit is external from the furnace, thus permitting more precise control and permitting the excess water vapor to be condensed out in a water jacketed condenser before passing the gas into the furnace. Common ratios used are approximately three volumes air to one volume city gas, or approximately seven volumes air to one volume natural gas, resulting in a protective atmosphere of approximately 6 per cent CO_2 , 7.5 CO , 9.5 H_2 , trace to 1 per cent CH_4 , and about 2.5 per cent H_2O at 70 deg. F. with N_2 making up the balance.

Although scale-free hardening could be obtained, this gas was found to be excessively decarburizing to all high-carbon and tool steels. Further attempts were made by removing all the H_2O by drying by means of an activated alumina dryer, but the gas still remained excessively decarburizing. The results of such an atmosphere are shown in Fig. 11 and by curve B in Fig. 12.

This atmosphere was investigated by Koebel², and he found that the CO_2 and H_2 components of the gas reacted with each other in the furnace by the water gas reaction to produce H_2O and CO . This reaction also takes place between CH_4 and CO_2 . The results of this investigation are summarized by the curves of Fig. 13. These curves show that the reaction begins to take place at about 1380 deg. F. and is accelerated as the temperature is increased. This investigation shows that either the CO_2 or the H_2 constituents must be entirely eliminated from an atmosphere if it is desired to keep the gas bone dry in order to eliminate in-

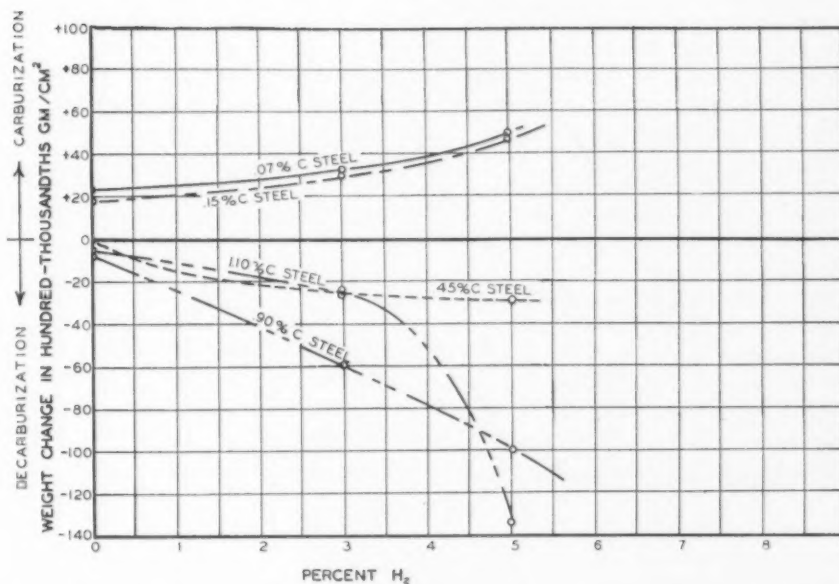


FIG. 14—Effect of increasing the H_2 impurity in a dried 34 per cent CO —66 N_2 atmosphere at 950 deg. C. (1740 deg. F.) for 3 hr. (Koebel²) This shows that increasing per cent of H_2 accentuates carburation of low C steels and decarburization of high C steels.

creased and accelerated decarburizing effects from H_2O . Inasmuch as CO_2 is a very strong decarburizing and oxidizing gas, the removal of or the maintenance of this constituent to a minimum is essential for decarburization-free hardening.

The complete removal of H_2 from an atmosphere would also be very desirable. Although purified and bone dried H_2 or H_2 — N_2 mixtures are in themselves only slightly decarburizing to high carbon and tool steels, a mixture of H_2 with other neutral but combustible gases may make a very decarburizing mixture. This is illustrated by the results of Fig. 14, which

will be explained in a later paragraph. Even though purified and dried H_2 or a mixture of H_2 with an inert, drier gas such as N_2 is used, some air is bound to leak through the furnace charging door, especially on a continuous type furnace, and this will burn with the H_2 to form H_2O , and thus a very decarburizing gas will result. The construction of a furnace to prevent air infiltration through the charging door is exceedingly difficult and practically impossible on a continuous production type. For this reason it would be desirable to keep even small percentages of H_2 from an atmosphere as well as the CO_2 if the

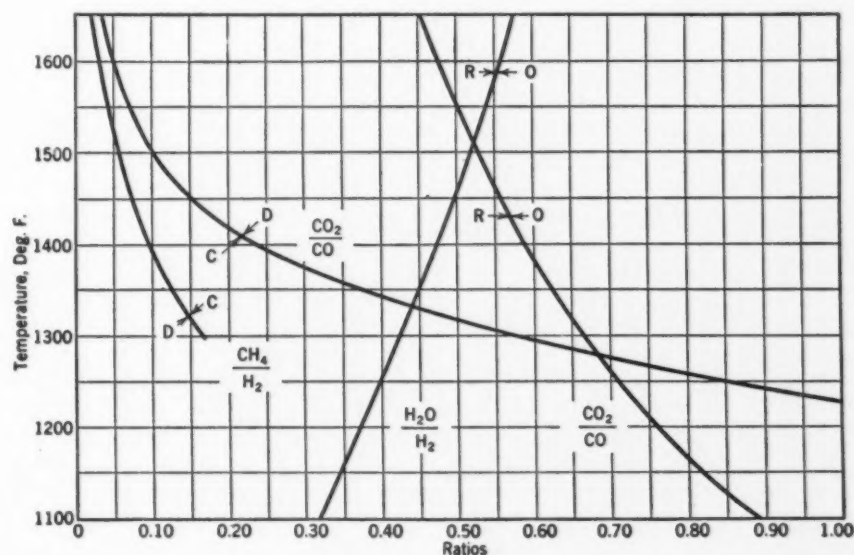


FIG. 15—Equilibrium ratios for the CH_4 : H_2 , CO_2 : CO , H_2O : H_2 reactions in contact with Fe-C alloys saturated with C at the temperature in question. (Stansel³) O = oxidizing; R = reducing; C = carburing; D = decarburizing.

desire is to make the atmosphere fool-proof and prevent the formation of H_2O which will cause otherwise neutral and inert gases to become excessively decarburizing.

Further studies on the gas-steel reactions were made by omitting the CO_2 and H_2 constituents as well as H_2O from the generator gas. A mixture of 34 per cent CO —66 per cent N_2 was synthetically prepared from purified and dried gases and was tried in a laboratory furnace. The significance of the above percentage lies in

on the generation of the CO gas and does not take place in the furnace after the gas has been purified.

The effects of a 34 per cent CO —66 per cent N_2 atmosphere on steels at 1740 deg. F. are shown by curve A in Fig. 12. This curve shows that this atmosphere is only very slightly carburizing to a very low-carbon steel and is neutral to medium and high-carbon steels. All straight-carbon steels and tool steels can be heat treated bright with the exception of steels high in chromium, such as the

carburization, or scale regardless of the temperature period of heat treatment. To obtain such results, however, this gas must be free from traces or impurities of CO_2 , H_2 , or H_2O . Any one of these impurities in a CO - N_2 mixture will cause decarburization. The effects of adding varying percentages of CO_2 to CO - N_2 mixture are shown in Fig. 16. These curves show that decarburization is greatly increased as the CO_2 content is increased. The CO_2 impurity also causes the steel surface to become dull and lose its brightness.

The effects of the H_2 in purity are shown in Fig. 14. These curves show that as the percentage of H_2 is increased, the atmosphere becomes somewhat carburizing to low carbon steels and definitely decarburizing to medium and high carbon steels. A combination of CO_2 and H_2 impurities would even be more decarburizing due to the water gas reaction which introduces H_2O . The action of such a combination of impurities may be seen by referring to curve C of Fig. 12, an unpurified, charcoal producer gas.

Slower and Gonser⁷ have shown that the decarburizing property of H_2 in a dried CO - N_2 mixture may be made neutral by the addition of CH_4 or some other hydrocarbon of a carburizing nature. The amount of CH_4 needed depends upon the H_2 content and the carbon content of the steel to be heat treated. Likewise, the decarburizing property of small percentages of CO_2 may be subdued to some degree but not completely removed as in the case of H_2 . They find that when combinations of H_2 - CO_2 , H_2 - H_2O , CO_2 - H_2O , or CO_2 - H_2 - H_2O are present, the counterbalancing of the decarburizing action by the use of CH_4 becomes very difficult and impossible unless these constituents or mixtures are present in very small percentages or traces. Later research work by an industrial furnace manufacturer has shown that the addition of small percentages of NH_3 as well as a hydrocarbon greatly assists in balancing out the decarburizing effects of small percentages of CO_2 - H_2 mixtures in a CO - N_2 atmosphere. This method will be further discussed at the appropriate place in the following two sections of this article.

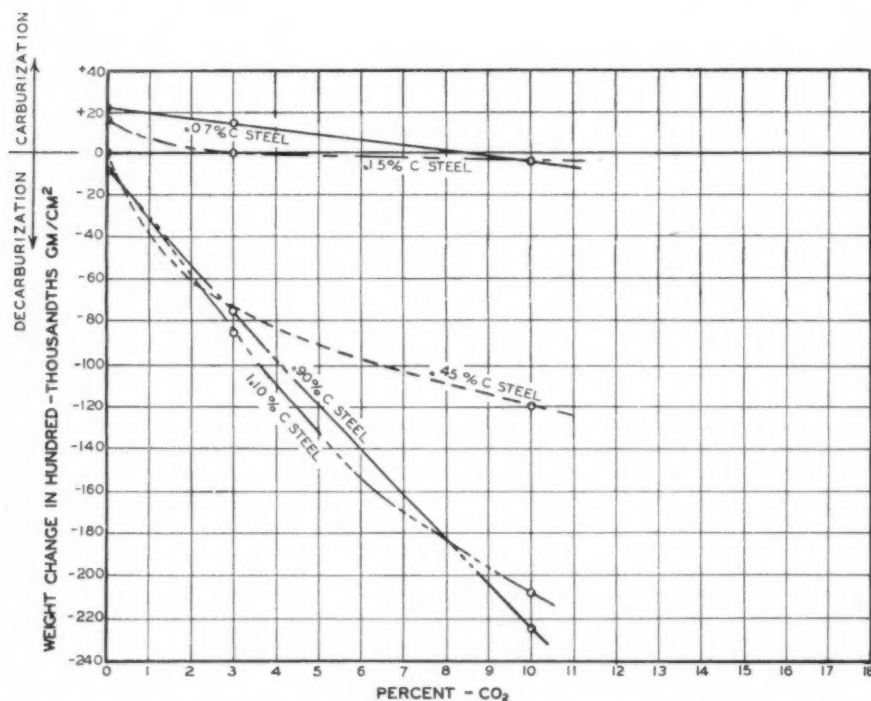


FIG. 16—Effect of increasing the CO_2 impurity in a dried 34 per cent CO —66 N_2 atmosphere on steels at 950 deg. C. (1740 deg. F.) for 3 hr. (Koebel⁸). This shows greatly increased decarburization with increase of CO_2 .

the fact that this is the composition of a gas that could theoretically be prepared from the combustion of air with pure carbon. Many believe that CO or CO - N_2 mixtures are carburizing gases. Such a belief has usually come about by the interpretation of equilibrium diagrams, such as Stansel's⁶, as shown in Fig. 15, or by explanations on the theory of carburizing. CO is not a carburizing gas unless accompanied by C (carbon) or nascent C in a similar manner that nascent N_2 must accompany N_2 in nitriding. In either case the CO or N_2 is a carrier, and the actual carburizing or nitriding is done by nascent C or by nascent N_2 . The only place where the purified CO - N_2 mixture might obtain C or nascent C is by the reversible reaction of $2 CO \rightleftharpoons CO_2 + C$. This reaction seems to take place only

high carbon-high chromium or stainless types. Such steels can be heat treated scale-free but are stained to a greenish black color caused by the slight oxidizing action of CO on chromium. If such steels are to be heat treated bright, CO must be eliminated from the atmosphere and dry hydrogen substituted in its place.

Equally good results as were obtained in curve A of Fig. 12 can be obtained by reducing the CO content as low as 5 per cent and the balance N_2 . Inasmuch as some air is bound to filter into the furnace and burn with the CO to form CO_2 , the higher the percentage of CO that can be supplied to the furnace the lower will be the CO_2 ratio in the furnace, and thus the least decarburizing the gas will be to high-carbon steels.

The CO - N_2 mixture is an ideal atmosphere for heat treating any type of steel free from decarburization,

⁶"Industrial Electric Heating," by N. R. Stansel, J. Wiley & Sons, New York, 1933.

Ed. Note — Next week the author continues with descriptions of recent developments in controlled atmosphere methods.

New Equipment . . .

Presses and Press Accessories:

Needs of the defense program are reflected in recently introduced press models, many of which were built for ordnance or aircraft work. Among mechanical types are an automatic multiple operation press and a two point press of 750-tons capacity.

Deep Drawing Press

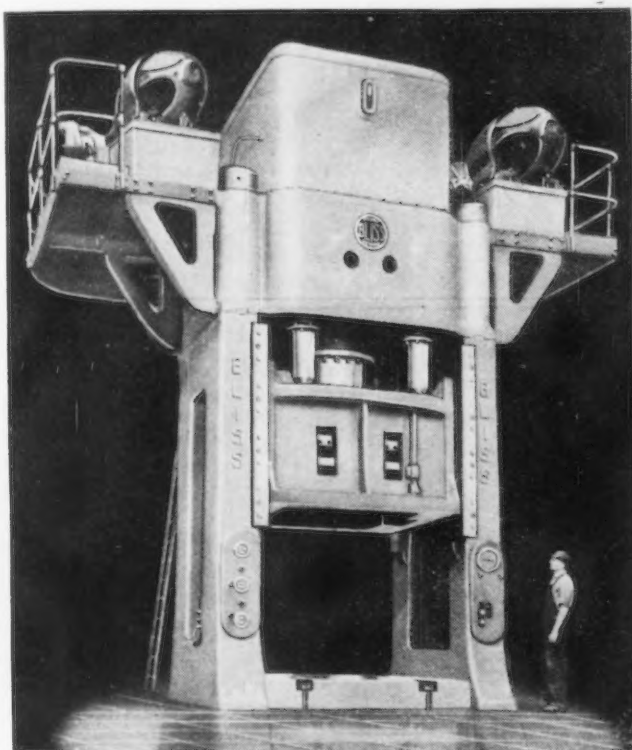
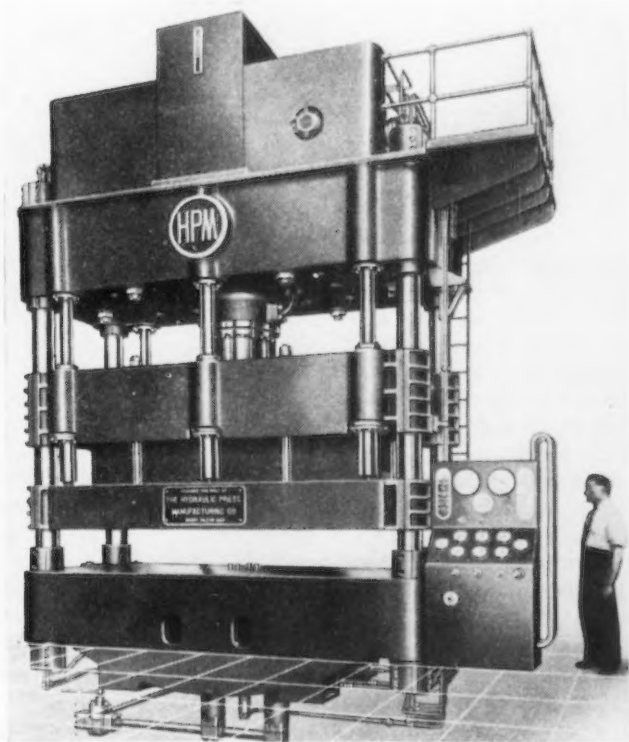
LATEST development of *Hydraulic Press Mfg. Co.*, Mount Gilead, Ohio, is a 650-ton triple action blankholder press for deep drawing gasoline tanks and other similar parts for the aircraft industry. This machine embodies three separate hydraulic actions for operating the main draw punch, the blank holder ring, and the die bottom of the regulation triple action drawing die. Draw punch is carried by the main slide actuated by the main hydraulic press ram of a double acting piston type. All three actions function from one

radial pump directly connected to a 100-hp. motor. The closed circuit operating system is said to give smooth action with valveless and shockless press reversal. Individual pressure adjustment of each blankholder pressure is possible at six different points. Capacities are: main platen, 650 tons; blankholder, 250 tons; die cushion, 133 tons. Closing and opening speed is 260 in. per min. and pressing speed is 45 in. per min.

Double Action Hydraulic Press

SMOOTHNESS of operation at high speed and economy of operation and maintenance are noted as out-

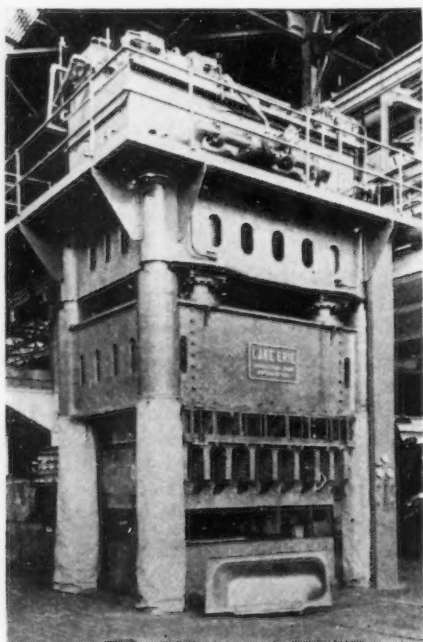
standing features of the new Bliss 800-200-ton Hydro-Dynamic press announced by *E. W. Bliss Co.*, 53rd Street and Second Avenue, Brooklyn. Unit is of the double action type with universal electric control and is equipped with an auxiliary hydraulic pressure cushion in the bed. The push button control system is arranged to prevent the inner slide from contacting the work until after the desired blankholder pressure is applied by the outer slide. The main drive brings the two slides simultaneously to the work, the inner slide halting for a fraction of a second while the blankholder pressure is applied, and then



proceeding at draw speed. Reversal may be controlled either by slide position or by pressure in the system. Positive inching for die setting is by means of push button control: Capacities are: Main slide, 800 tons; blankholder slide, 200 tons; cushion in bed, 150 tons. Maximum stroke of main slide is 42 in. Two 125-hp. motors operate the press.

1700-Ton Hydraulic Press

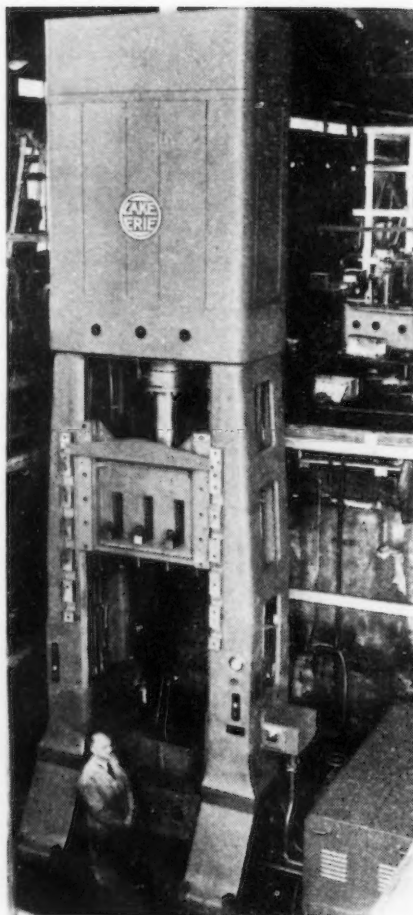
WHAT is said to be the largest double slide hydraulic press in America having a capacity of 1700 tons has been announced by *Lake Erie Engineering Corp.*, Buffalo. Accompanying illustration shows unit used for cold forming of 5-ft. bathtubs in one operation from 14 gage sheets. Press exerts a pressure of 900 tons on



blankholder and 800 tons on main ram. High holddown pressure is said to eliminate wrinkling of edges of sheet without use of draw beads. Stroke is 37 in. and daylight opening is 98 in. Bed is cushioned. Press has a speed of several cycles per minute and entire unit is self-contained with pumping unit mounted on top. Vertical columns are covered by fabric boots for protection against abrasive dust. Adjustable pressure control of blankholder and main ram is provided.

Long Stroke Hydraulic Press

SPECIALLY designed for drawing cartridge cases, the 150-ton hydraulic press announced by *Lake Erie Engineering Corp.*, Buffalo, boasts an



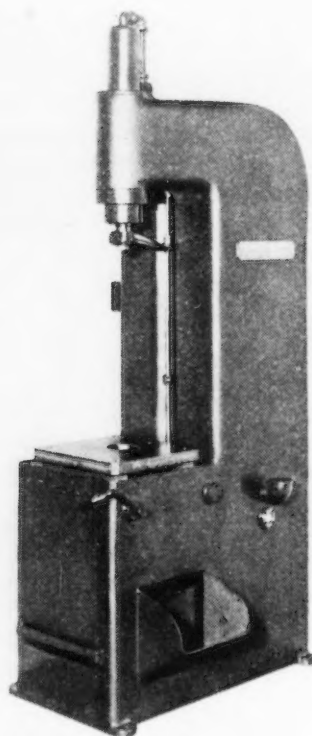
unusually long stroke. The unit has 108 in. of daylight and a 76 in. stroke. Solid housing with gib-guided platen, adjustable knock-out bars available for certain types of work, and fast approach and return are other features of this unit. Conveniently located push buttons control inching, semi-automatic and full automatic operation. Adjustable control of working pressure, as well as length of up and down stroke contribute flexibility to suit various operations and save die setting time. Top of press is enclosed with removable panels.

Hydraulic Die Lifter

DESIGNED principally for handling heavy dies, the new portable Weld-Bilt hydraulic die lifter announced by *West Bend Equipment Co.*, West Bend, Wis., has a net lift of 4 ft. and lowers to within 8 in. of floor. Capacities from 500 to 2500 lb. are available. Lift is hand operated, with a hydraulic raising and lowering unit mounted horizontally beneath the platform. Finger tip control is located at the top of the operating handle. Pump handle can be locked in several positions for extra maneuverability. Lift is of the double cable type.

General Purpose Press

A LINE of moderately priced general purpose hydraulic presses for such operations as assembling, broaching, etc., is announced by *Colonial Broach Co.*, Detroit. Designated as the Senior line, the presses range from 1 to 10 tons in capacity, with strokes ranging from 18 to 42 in. Open side fixed table construction is said to permit working on long parts which extend beyond the table, as in straightening or assembly. Separate centrifugal pump is provided for work requiring heavy flow of coolant. Special hydraulic circuit is available which permits use of shuttle type fixtures, if desired, to speed up unloading and

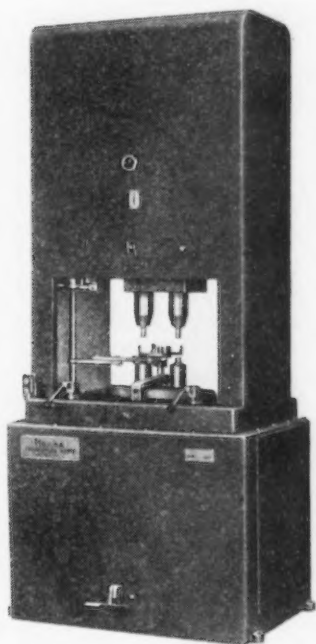


loading. Presses are made in seven sizes—1, 3, 6 and 10-tons capacity, with strokes of 18, 18 or 24, 24 or 36, and 30 or 42 in. respectively. Floor space requirements of smallest model is 18½ x 30½ in. and for the largest is 29 x 51 in.

Riveting Presses

FROM one to six or more rivets may be driven simultaneously, with equal pressure exerted on each rivet regardless of variation in length, hardness of rivet or ordinary variation in grip, in the new electric-hydraulic riveting presses introduced by *Hanna Engineering Works*, Chicago. Units with capacities from 10 to 100 tons are available. Motor, pump, controls,

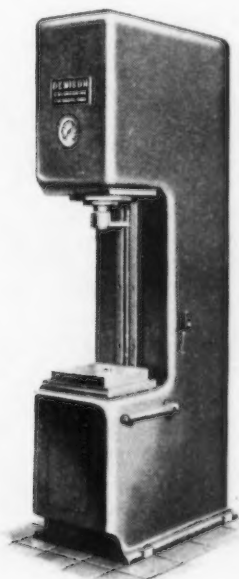
pipng, cylinder and reservoir are totally enclosed. Side panels are removable. Work assembling, loading, alining, clamping and rivet nesting



features may be built in as accompanying photograph shows. Complete riveting stroke of all dies can be accomplished in less than 2 sec.

Small Hydraulic Presses

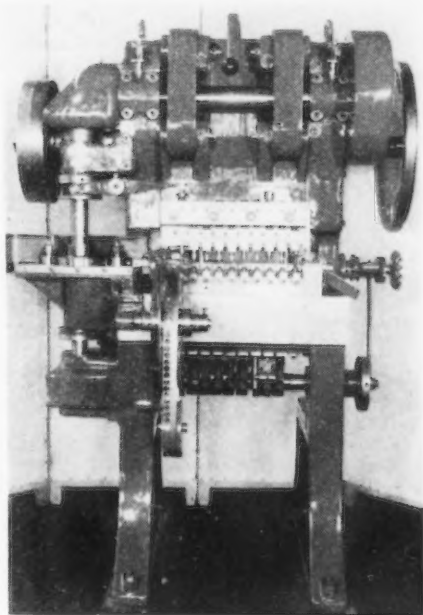
FURNISHED in capacities from 5 to 50 tons, the new small hydraulic press developed by *Denison Engineering Co.*, Chestnut and Water Streets, Columbus, Ohio, is said to be highly versatile and suited for assembling,



straightening and general production forming. Designated as type DLAC2, these presses have strokes varying from 12 to 24 in. Control valve with its operating mechanism, motor and pump are in the center section of unit. Ram and cylinder assembly is located in the upper part of the frame. Up and down stroke and pressure are adjustable. Pump is of the constant volume vane type.

Multiple Operation Press

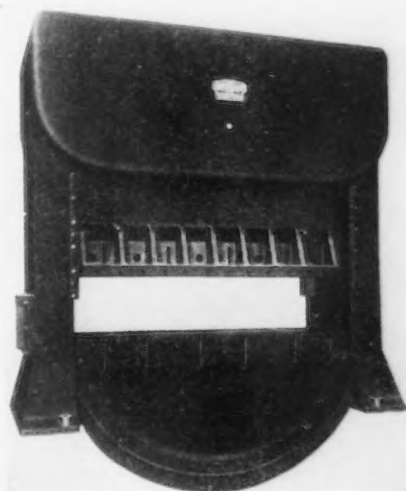
HIGHLY flexible is the automatic multiple operation press manufactured by *Baird Machine Co.*, Bridgeport, Conn. Machine is basically of the nature of a wide press with a wide slide and a vertical shaft extending down the left side of the machine (which may be used to drive a transfer mechanism) and a horizontal shaft



underneath the bed and on which dies are supported. These shafts are used for operating the numerous attachments and devices which can be adapted to the unit. Press also has post guided die sets which can be quickly interchanged as a unit without disturbing adjustment of punches and dies. Units have been supplied with a reciprocating positive gripping slide feed to take ribbon material and feed and perform operations in the metal before a blank is cut. Other types available include roll feed with automatic locating devices when it is desired to feed metal through press more than once; feeding preformed material, turning over work after certain operations, and hopper feed. Progressive dies can also be accommodated.

Two Point Press

SYMMETRICAL front and back design, double gearing and a drive unit that is located in the box type crown are features of the new two point press of 750 tons capacity developed by *Cleveland Punch & Shear*



Works Co., Cleveland. Press is equipped with a pneumatically operated friction clutch and brake and flywheel is provided with an air brake for use in bringing the flywheel to a quick stop when power is cut off. Slide is counter balanced by air cylinders located in the uprights. Bed has an area of 52 in. front to back and 156 in. left to right and is equipped with a T-slotted bolster plate and pneumatic cushions. Slide stroke is 12 in. Press operates at 9 strokes a min.

Variable Displacement Pumps

TWO way, three position, electric controlled variable displacement pumps are now being manufactured in sizes from 2 to 150 hp. by *Oilgear Co.*, West Bruce Street, Milwaukee. These heavy duty, radial, rolling piston type pumps utilize a high grade oil as the fluid power medium. Each size is available with internal pumping mechanisms for normal working pressures of 1100, 1700 and 2500 lb. per sq. in., and for peak pressures up to 3000 lb. Pumps are equipped with built-in auxiliary gear pumps for



supercharging the high pressure unit, for operating pump controls and for auxiliary purposes. Built-in reverse flow high pressure adjustable relief valves protect pump against overload. It is possible to reverse direction of oil flow in these units and also select a neutral position at will from a remote station. Oil delivery of unit illustrated can be varied from 0 to 16,500 cu. in. a min. in either direction.

Toggle Drawing Press

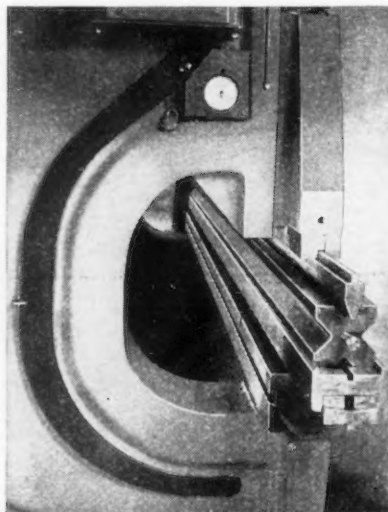
A NEW line of straight sided double action toggle drawing presses with plunger slide capacities of 650



tons have been announced by *Toledo Machine & Tool Division, E. W. Bliss Co.*, 1420 Hastings Street, Toledo. Presses are of four piece shrunk-in-tie-rod construction. All gearing, eccentrics, etc., are enclosed in crown. Lower motion is independently driven and electrically synchronized. An exceptionally long adjustment is available for high and low dies. Slide is counter balanced by air cylinders. Distance from bed to slide with stroke down and adjustment up is 75 in. A hydraulically operated brake for stopping flywheel after power is off is also supplied.

Tonnage Indicator

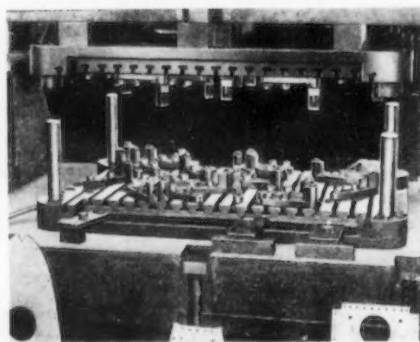
TONNAGE indicators for Steelweld bending presses are now available from *Steelweld Machinery Division, Cleveland Crane & Engineering Co.*, Wickliffe, Ohio. Indicator



has two pointers: A job pointer which registers tonnage for the job being worked, and a maximum load pointer which shows the maximum load at which the press has ever been operated. Job pointer can be reset to zero at any time. The unit serves to give warning when dies are worn and tells when press is being overbottomed.

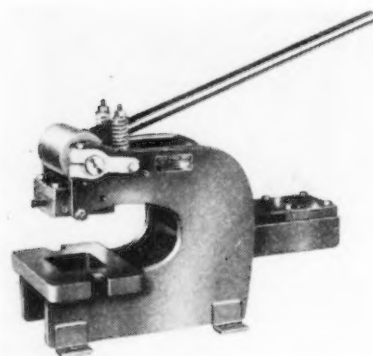
Adjustable Die Sets

AID in reducing time required to get into production and at the same time answering the problem of economical dies for perforating and notching sheet metal is provided by the Universal adjustable die sets manufactured by *S. B. Whistler & Sons, Inc.*, 748 Military Road, Buffalo. Made in various sizes, these sets permit closer grouping of punches and stripers. Sets are available in stock sizes from 0 to 1½ in.



Hand Punch Press

DESIGNED to accommodate most blanking punches ordinarily used on small power presses, the hand operated punch press offered by *Leslie Welding Co.*, 2943 Carroll Avenue, Chicago, has no ram, ways or slides. Accuracy of this unit is said to equal a leader pin die set. Press is especially adapted to blanking or punching small stampings or punching along the edge of large sheets. Punch plate is 4 x 4½ in. and clearance from punch plate center to frame is 6 in. Stroke is 7/16 in. and stroke adjustment is ⅛ in. Capacity is a 2-in. diameter hole through 14 gage mild steel or 16 gage 18-8 stainless. Manufacturer claims that the new method employed



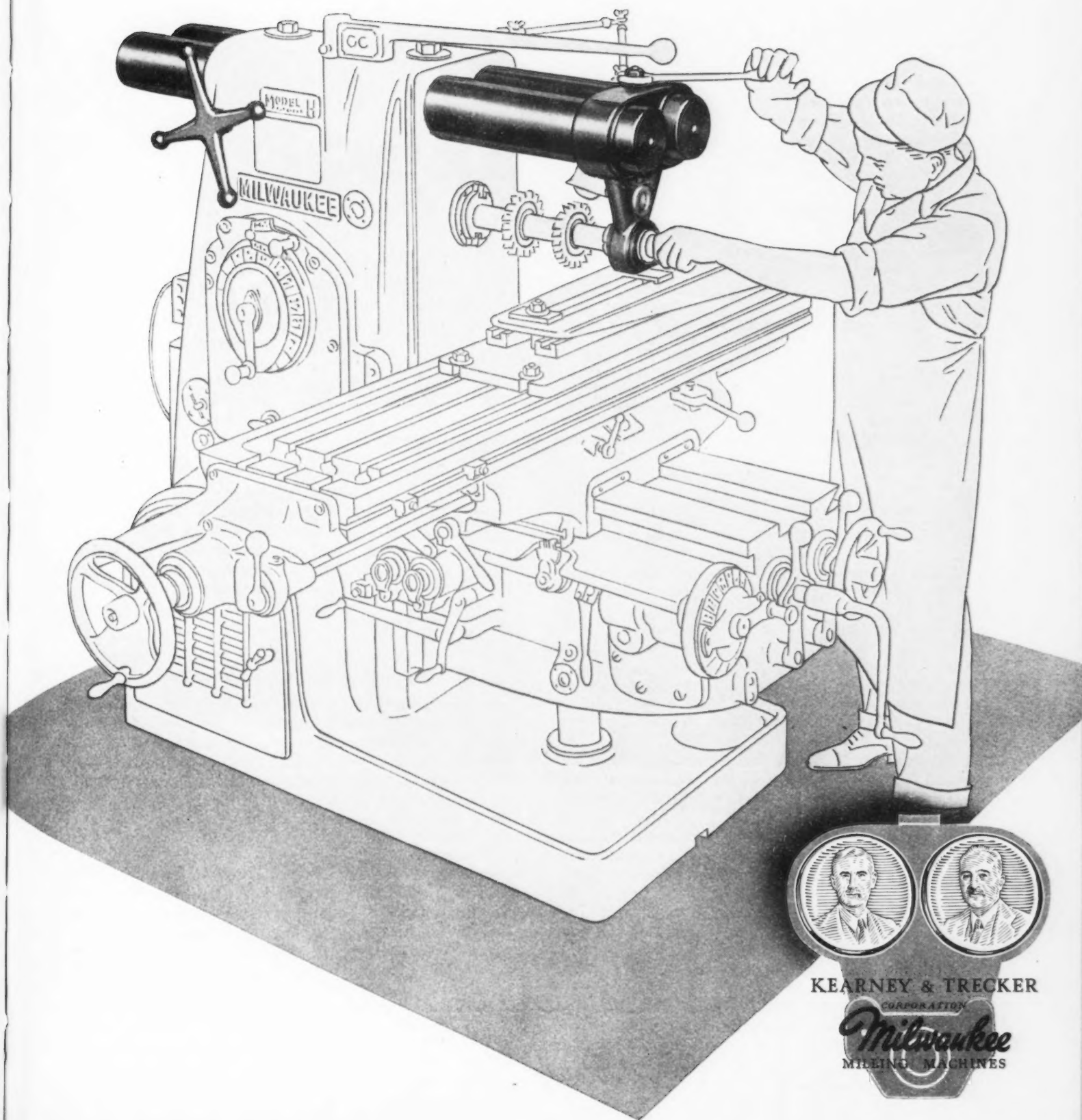
in aligning punches and dies is so positive that shearing of dies is practically impossible and it is not necessary to center load on punch plate.

Scrap Cutter

SCRAP cutting can be combined with the cutting of finished material by use of the single intermittent type scrap cutter being manufactured by *F. J. Littell Machine Co.*, 4151 Ravenswood Avenue, Chicago. By setting the unit to operate at a predetermined number of press strokes, scrap can be cut to any desired length. Cutter blades are held open by springs in normal operating position, and a gag or blocker unit is built into the scrap cutter connection. This gag is moved from blocking to cutting position by a solenoid connected electrically to a controlling unit consisting of a ratchet, a driving mechanism for operating the ratchet at one or more teeth per stroke, and a switch operated by trip lugs. The trip lugs are placed at points on the ratchet gear, tripping the switch at every so many strokes of the punching press. This intermittent feature can easily be added to any Littell scrap cutter now in use.

In the advancement and development of milling machines, the overarm has played an important part. The construction of the Milwaukee double overarm increases rigidity and provides easy access to the arbor and cutters — a most important convenience to the operator.

KEARNEY & TRECKER CORPORATION • Milwaukee, Wis. U. S. A.



MILWAUKEE MILLING MACHINES

DETROIT — The magnitude of the job of producing thousands of airplane engines for defense purposes was impressed indelibly on the minds of hundreds of tool engineers in the automobile industry recently when Kenneth Sutton, production manager, Wright Aeronautical Corp., Paterson, N. J., told them how and why extreme accuracy and perfect finish are built into the high-horsepower powerplant. Despite the typical Detroit self-assurance in handling tooling problems, Sutton's talk proved to be an eye-opener in more than one respect. Himself a former automotive man and Detroit, and instructor in the Ford Trade School in 1924, Sutton has had years of experience on the ticklish job of producing engines for airline use. As a result, he talked the language that Detroit understood and backed it up with a specialized experience that Detroit is just on the threshold of gaining.

Discusses Problems of Producing Engines

Describing the products similar to those which will be manufactured in the automotive capital as soon as tooling can be completed, Sutton said that the bulk of 1941 production of Wright engines will be the double row 14-cylinder 1700 hp. radial engines. The more recently developed 2200 hp., 18-cylinder double row engine is more or less of an experimental model and will not be in mass production until 1942. Wright, itself, is equipping a 2,000,000 sq. ft. engine plant in Cincinnati for production of 1000 of the new 1700 hp. engines monthly, with \$20,000,000 being spent on machinery. This will bring Wright's floor space to 5,100,000 sq. ft. Output at the main Paterson plant will reach 50 engines a day next spring. In addition, Continental will begin next spring to manufacture Wright engines for tanks.

Addressing the Detroit chapter of the American Society of Tool Engineers, Sutton dealt in considerable detail with the problems of manufacturing such products as a 1700 hp. aircraft engine, weighing 1.1 lb. per hp. and involving 900 separate parts, composed of more than 8000 pieces. Each piece requires an average of 50 machine and hand operations. He cited the master (connecting) rod on which there are 127 operations—65 on machines and the remaining 62 performed by hand, mostly to remove tool marks, etc.; also the simple cap screws which hold airplane engine cylinders in place, requiring 27 operations on each screw; finally, the forged cylinder sleeve which weighs 70 lb. when it starts on the production line and weighs only 12 lb. when excess material is removed.

On The Assembly Line

BY W. F. SHERMAN

Detroit Editor

• **Automobile industry, although accustomed to precision work, will have problems to solve in attaining the fine accuracy required in airplane engine work . . . Small plants must play a more important part in defense manufacturing . . . Holiday affects automobile output**

Coming from such a source, the information could not fail to impress listeners with the fact that the aircraft engines of today are indeed as fine as a Swiss watch; yet Sutton pointed out the fact which automobile people have harped on consistently, that is, that in automobile engines the tolerances are just as close, in the running fit. The difference in specifications, the Wright expert declared, is that the aviation industry holds every dimension on every part to the same fine accuracy and insists on mirror-like finishes. Two reasons were given for this. First, while the automobile engine weighs 5 or 6 lb. per hp., the aviation engine is held to approximately 1 lb. per hp. As a result each part is more highly stressed. The high stress, bringing with it the danger

of failure from fatigue, brings also the necessity for removing every tool mark and every sharp corner. Thus, perfect finish all over every part is "a religion in our shops," Sutton said.

All holes on plane engine parts are reamed or ground, not drilled, because the surface produced by drilling a hole would not pass inspection. Even at the bottom of a hole 3/16 in. in diameter, no sharp edges are permitted. Corners are broken on every piece ("not filed off, so you have two edges instead of one") and turned finishes are not acceptable on any engine part.

Super-refinement in Engines Essential


Second reason for demanding such high quality is the engine performance which is required. Responding to a question from one of his listeners, Sutton declared that he could see no possibility of doing away with much of this super-refinement in the production of power plants for military airplanes, even though their period of usefulness in the air might be comparatively brief.

"I don't think any of us knows how to make a short-term engine," he said. "A so-called 20-hr. engine might turn out to be a 20-min. engine. The motors we are turning out for the armed services, and this includes the British, are good for 400 hr. between overhauls, which means a lot in the life of a combat plane when you consider that anywhere from a day to a week may be required to service the engine.

He added that there are reports of instances in Britain where pilots have operated American-made engines "full out" for as long as 20 minutes without failure. The engines are only guaranteed for such maximum performance for 15 seconds. Probably this point went over the heads of many of his listeners

EXPERIMENTING?

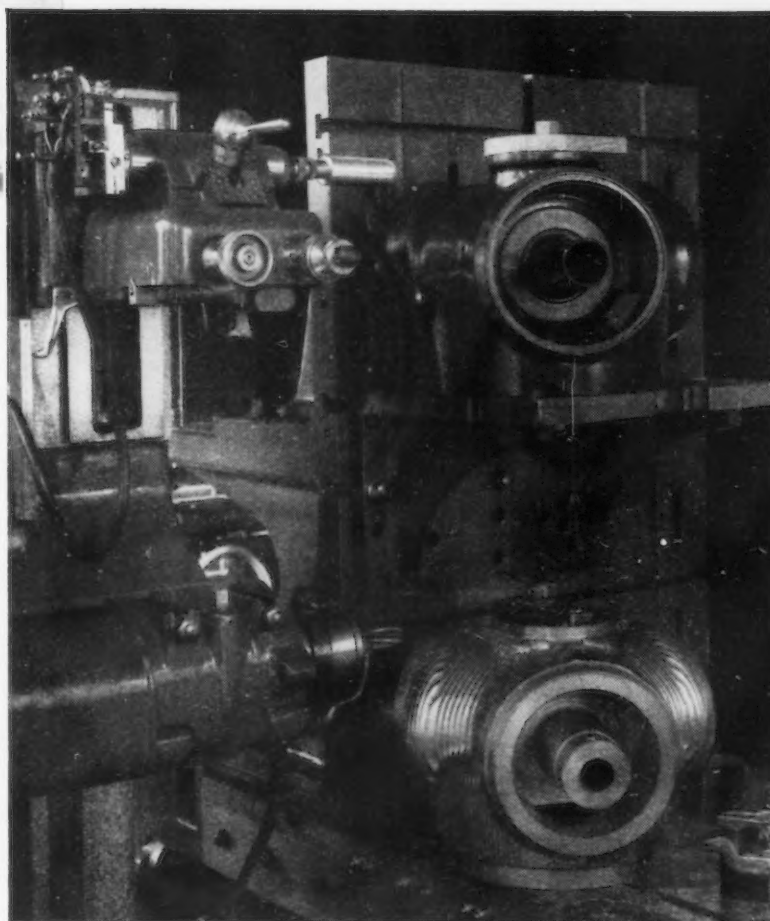
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WITH new products the order of the day . . . with national defense making unusual demands upon the facilities of industry . . . manufacturers are discovering an immense *additional* advantage in their Keller Machines. In many a case where the Keller was purchased primarily for die-cutting, it is now in valuable *additional* service as a producer of *experimental parts*. Take *both* these services into consideration when you calculate the return on your investment—past or future—in a Keller.

Fully automatic, the Keller cuts complex three-dimensional work with amazing accuracy in any material, large jobs or small. Making experimental parts, Keller serves this way: actual-size model is made in wood, cement, or the like. This master is mounted on the Keller, and perhaps a dozen exact duplicates are cut in whatever metal the finished part is to be. These identical experimental units are then used as needed—for breakdown tests, analyses for metallurgical properties, samples for contract bid jobs, etc. This method removes any question of design quality, and all kinks are ironed out *before* investment in tools and fixtures is made. And many times this experimental method, with a little more permanent fixturing, becomes the best production method for the job.

Keller does regular die work quicker, better, cheaper . . . produces experimental parts at low cost, fast, *in the actual metal*. Write for details, or ask any P&W representative.



Keller makes a roughing cut on three-blade experimental propeller hub. *Only one-third* of wooden master was finished to size—metal hub was produced by indexing at 120° intervals. Later this became part of a finished experimental propeller which was flight tested.

PRATT & WHITNEY
Division Niles-Bement-Pond Company
West Hartford, Connecticut, U. S. A.

KELLER MACHINES

unless they were familiar with the fact that "full out" in this instance means not only full throttle, but full supercharging, even though near sea level. In other words, each cylinder was taking a charge of air and gasoline pumped into it by a 14-1 or 17-1 blower and, at the same time, was operating at full speed. Normally the superchargers would operate only at altitudes where the atmospheric density is much less than at sea level or near the ground.

Because demands like these are put on the engines, every part is machined all over—with two exceptions, valve rocker arms and pistons. Extent of the machining is indicated by one more example: to save a pound or so on each engine, the crankcase is machined between cylinders—a small job but it adds 400 min. to production time on each engine and the equipment for the job costs \$170,000.

In the light of the foregoing, plants here which undertake airplane engine work will have a task of adapting themselves to new standards. Already those which have tackled such assignments have some lessons to report. Both Wright and the Pratt & Whitney engine divisions have assigned inspectors here to cooperate with vendors and suppliers to avoid misunderstandings and eliminate rejections which might be made otherwise.

Although much tool, jig and fixture work has been placed here, most of the tool and die capacity is still idle, with no immediate prospect of being put to work. One reason is the reluctance of tool and die men to attempt aircraft work because they have heard repeatedly that the demands are too "fussy." Another reason is fear that they will lose money trying to meet specifications that they do not quite comprehend. Third, has been an inability of the small shop operator to make contact with principal contractors. However, both the engine builders and the defense commission are taking steps that will help solve the latter problem.

Increasing emphasis should be placed on the small shop in the thinking of major executives and planners of the defense program. So far it must be confessed that the small shop has been on the out-

side looking in. The reasons for this are obvious. The plans for production of important defense items are always phrased in large quantities. When orders have been allocated, the tendency has been to look around for one or two sources of supply that could take care of the whole thing.

Of considerable importance to the operator of the small shop is the action not long ago by the National Defense Advisory Commission in

All Shops Should Train Workers—F. E. Searle

Detroit

• • • ALL SHOPS, LARGE AND SMALL, must set up training programs to prepare for national defense, F. E. Searle, superintendent of the Henry Ford Trade School, declares. Neither expense nor problems of training technique should prevent even the smallest shop from doing some training, he emphasized.

Searle, in charge of the preliminary mechanical courses of youths who next year will be employed in making Pratt & Whitney airplane engines at the Ford Rouge plant, indicated that the prospective shortage of skilled operators for machines had prompted Henry Ford to offer his facilities to train Navy machinists also.

placing orders for Army shoes with virtually every shoe manufacturer, in accordance with capacity, rather than placing huge orders with one or two of the big manufacturers.

This was a straw in the wind, not unlike the current plan for handling the automotive production of airplane parts. The Automotive Committee For Air Defense under C. C. Carlton, now permanent director, has arranged an exhibit of parts and has followed up by inviting all interested manufacturers, especially the small ones, to inspect the samples, decide what they can manufacture in their plants and let defense people know about it.

A Detroit industrialist has suggested to defense authorities that

five or six major exhibits be set up throughout the country for inspection by potential manufacturers, or that all defense requirements be cataloged the way mail order mercantile establishments might do the job. Donald M. Nelson, former Sears, Roebuck & Co. executive, already seems to have such ideas in mind, and the program might follow the course which Sears, Roebuck has followed in similar circumstances. As is quite generally known, this organization has been extremely successful in the policy of placing orders for production of its requirements with shops throughout the country.

Belated recognition of the small plant's place in the defense program is, without doubt, a development of greatest importance. Today, throughout the mid-West, it is possible to walk into one plant after another where unused capacity is available and waiting. Frequently this capacity is not the kind that could carry out a complete government contract but, as sub-contractors, such manufacturing plants could make important contributions by fabricating or machining.

Opinion among executives seems to be crystallizing with the added thought that, for the most part, new plant space is needed only for assembly—plenty of manufacturing space being available. If such a program is successful it will, by the way, offer some relief to the machine tool industry, which otherwise would be called upon to build new machines for every operation required in the defense program. Probably the first working out of this program will be the automotive industry's fulfilling of the bombing plane contract which Mr. Knudsen says is forthcoming.

Holiday Affects Output

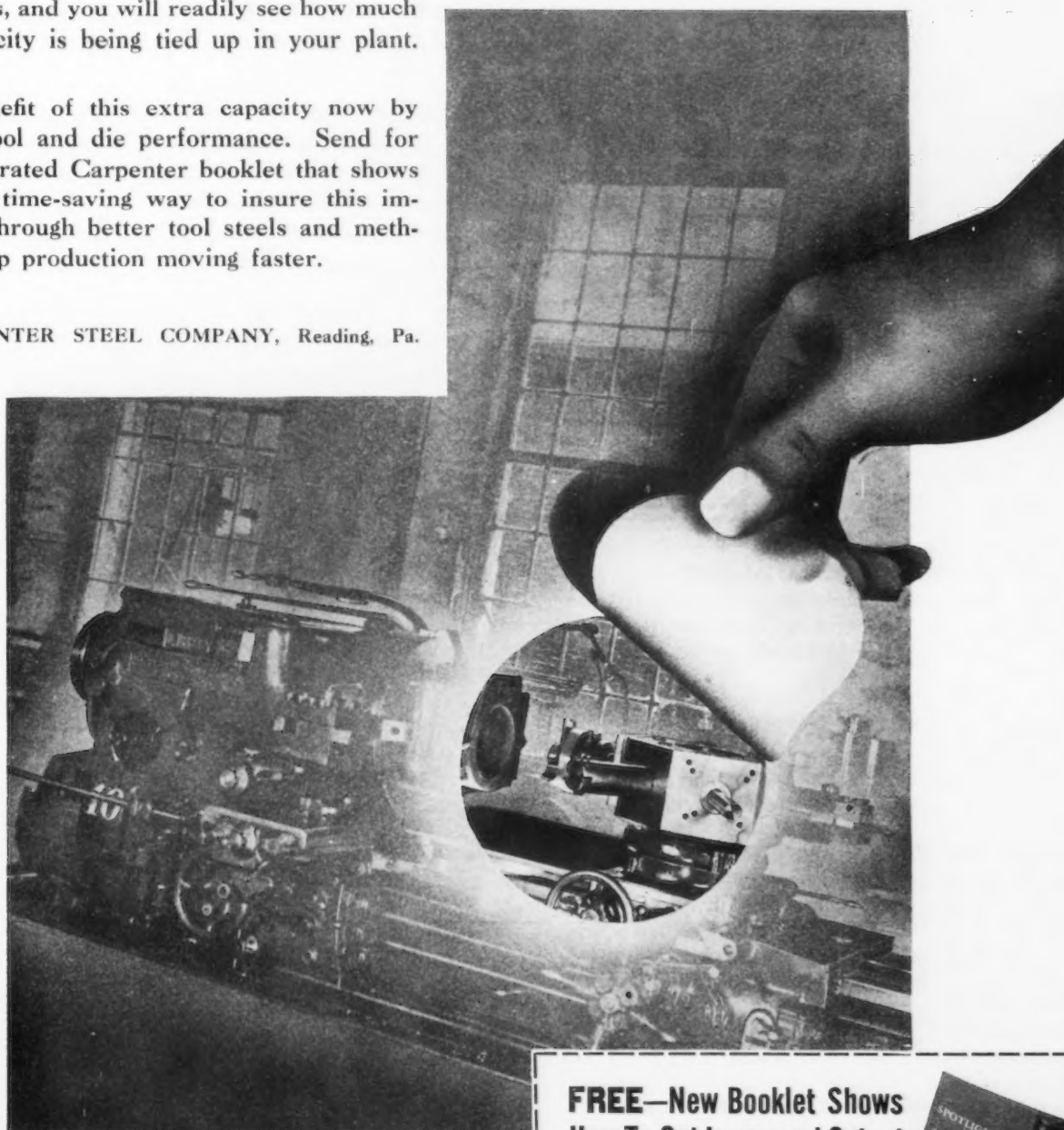
Because Michigan celebrated Thanksgiving on Nov. 21, automobile production dropped during the past week to 102,340 cars and trucks, compared with 120,943 (revised) in the previous week and 72,520 in the corresponding week of last year, according to Ward's Automotive Reports. Output for the current week is expected to rebound to the pre-Thanksgiving level.

TO relieve congested machine shops or press rooms, look for hidden plant capacity in your present production set-up. What is this hidden plant capacity? It is the hours lost at each machine through shutdowns caused by poor tool performance. Every time a tool must be re-ground or replaced, it ties up the production of one machine. Multiply this by the number of shutdowns caused by prematurely dull, broken or worn tools, and you will readily see how much hidden capacity is being tied up in your plant.

Get the benefit of this extra capacity now by improving tool and die performance. Send for a new, illustrated Carpenter booklet that shows the modern time-saving way to insure this improvement through better tool steels and methods that keep production moving faster.

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WASHINGTON — President Roosevelt has said that he expects no steel ingot shortage when the Great Lakes ore shipments are resumed in the spring. The industry sees a possibility of a temporary tight situation regarding ore supplies but does not look for any serious lack of this material.

Despite these assurances, however, there continues to persist in Administration circles the contention that there is not enough ingot capacity to meet defense and civilian requirements. So thoroughly has the campaign of shortage been conducted that some sources which usually are reliable are publishing statements which in a matter of course manner speak of the "bottleneck" in steel capacity. There are unquestionably some in the Administration who sincerely believe in the steel scarcity theory. At the same time there are others who are suspected of having originated the theory and inculcated it in the minds of colleagues as well as having spread it to wide public circles

Rumors of a Government Plant

These sponsors of the shortage idea are further suspected of seeking the establishment of a government-owned and operated steel industry, not so much to meet defense requirements as to use it, whether in operation or not, as a club over prices. Though vague, much has been heard just recently about the government establishing a "completely integrated steel plant" on the Pacific Coast, getting power from one of the government dams. A "completely integrated" steel plant yet to be built would not be much of a factor as a national defense producing unit for two years or so. If such a plan is seriously in mind or even if it is being toyed with only tentatively by a restricted group of economists, the conviction is inescapable that the purpose would be to set up a price yardstick for steel. This would, of course, be a step toward socialization of industry. There is no doubt that, even if the United States succeeds in keeping out of war, widespread feeling exists that pressure for broader government control over industry will increase.

As to claims of a threatened steel shortage, they are dispelled by a few facts. The industry has a rated ingot capacity of about 83,000,000 net tons annually. Its potential capacity is 87,000,000 tons. It is currently operating at a rate of approximately 78,000,000 tons of raw steel, or about 55,000,000 tons of finished products. The maximum production of finished products for domestic consumption in the previous peak year of 1929 was approximately 45,997,746 net tons. Hence



• Contention in Administration circles that there is insufficient steel capacity not borne out by analysis . . . Vague rumors still heard that government may build "completely integrated" steel plant in West . . . Billion dollars' worth of defense is now underway

the current rate of production is about 9,000,000 net tons on an annual basis over the 1929 output. Defense requirements probably will not take 9,000,000 tons a year. It has been estimated that steel requirements for the defense program are not expected to exceed an annual maximum of 6,000,000 to 7,000,000 net tons of ingots. The entire Navy program over a five-year period is said to call for less than 3,000,000 tons. British requirements are expected to run generally between 400,000 and 600,000 tons monthly, sometimes going below this minimum and at other times exceeding this maximum.

The 1929 consumption of finished steel, it is to be remembered, covered a period of all sorts of speculative enterprises, such as hotels, apart-

ments, office structures, etc., some of which have never been filled and many of which became involved in bankruptcy proceedings.

While it is true that defense contracts are just beginning to affect rolling schedules noticeably, it is likewise expected that the present heavy inventory ordering will let up soon, perhaps by the end of the year.

Just now bookings are extremely heavy and it is said they represent some speculative buying based partly on concern lest the government step in with priorities. This view, however, does not appear to be justified, since Washington activities would indicate that steel priorities are not an early prospect.

It is held to be likely that there may be a temporary jam in rolling steel for plant expansion, but this concentration of demand is expected to disappear by early spring.

Capacity Believed to Be Sufficient

With the let-up of inventory buying and elimination of brief jams, the capacity of the industry is expected to be easily capable of meeting all demands, though this does not mean there won't be bottlenecks at times in certain lines, such as armor plate. Indeed there is a view that, assuming defense demands continue as now contemplated, the industry within 18 months will be operating at a rate substantially below the present rate.

Discussion of the ability of the steel industry to meet demands necessarily takes into account the present outlook and the future, so far as it can be discerned. Obviously it does not take into calculation the matter of greatly enlarged demands on the American industry that would arise from destruction of capacity abroad.

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Their sturdy construction marks the type of special design created by American MonoRail engineers to meet unusual condition. With the use of standard units such as the American MonoTractors, such equipment can be fabricated at no excessive initial investment.

It is the extreme flexibility of such standard parts that makes it possible for American MonoRail engineers to meet special requirements without extra cost. Their service is available for consultation in any handling problem at no obligation.

A 250 page book used as a technical reference for all data covering Mono-Rail Equipment will be sent on letterhead request.



THE AMERICAN MONORAIL COMPANY

13103 Athens Ave. Cleveland, Ohio

Government Analyzes Manufacturing Costs

Washington

•••Containing no final recommendations for government policy, either legislative or administrative, a TNEC monograph, entitled "Industrial Wage Rates, Labor Costs and Price Policies" points out that nevertheless it is clear that wage rate changes do not necessarily affect earnings, labor costs, or prices in the same proportion.

The study was prepared under the direction of Isador Lubin, Commissioner of Labor Statistics and a member of the committee, and was confined to six plants, including the International Harvester Co., and five other plants which are not identified by name, two paper companies, two cotton textile mills and three shoe factories. The study of the International Harvester Co. was prepared by John T. Dunlop and Edwin M. Martin of the TNEC staff of the Bureau of Labor Statistics.

In a release on the study, Senator Joseph C. O'Mahoney, TNEC chairman, said it indicates the need for sufficient flexibility in legislation or regulation affecting wages or prices to permit adjustments for differences between industries, as well as between segments of the same industry.

This study, according to Mr. Lubin, "gets down to cases on what happens in particular companies when wage rates are changed, when prices are changed, and when new machines or techniques are introduced; it describes the processes by which these changes take place as management sees them, and discusses their varying effects on costs and on profits."

The report says that in several of the companies studied, wage policies were influenced directly by negotiations with unions or by the possibility of unionization. It is stated that there was a greater degree of uniformity in the wage policies of competing firms in industries with strong unions than in industries where relatively few employees were organized.

No "Pull" Needed To Get U. S. Orders

Washington

•••THE WAR DEPARTMENT warned prospective government contractors last week to turn down offers by individuals who represent themselves as having influence with the department and able to obtain government defense contracts.

"There is no truth in representations of this sort," said Assistant Secretary of War Robert P. Patterson. "Business concerns are cautioned against having dealings with persons who make such representations or offer such services."

Secretary Patterson also emphasized that defense contract forms contain a warranty by the contractor that he has not employed any person to solicit or secure the contract on any agreement for a commission, percentage, brokerage or contingent fee.

Breach of this warranty, he said, gives the government the right either to cancel the contract or to deduct the amount of such fee from payments due the contractor. The department has indicated that it intends to enforce this provision in all cases.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



In the International Harvester Co., it is pointed out, changes in overhead cost per unit of output due to wide fluctuations in the volume of production dominated the cost figures in the broad swings of business from great activity in 1929 to depression in 1933 and recovery in 1937. In the other three industries, the study says, raw material costs were the principal factors in changes in total costs per unit of output.

At times when volume of output is rising or falling very rapidly changes in direct labor costs are of less importance than changes in overhead costs per unit of output in industries where overhead costs are large in the aggregate, it is stated. In the International Harvester Co., for example, the report says, wage rates were reduced about 18 per cent between 1929 and 1933, while, because of the great reduction in sales and hence in output, "seasons' costs" of production actually rose during the same period by amounts ranging from 13 per cent to over 80 per cent for the 12 implements studied. Between 1933 and 1937,

it is added, conditions were reversed, wage rates and labor costs rose, but seasons' costs per implement declined as a result of larger volume and lower unit overhead.

The study also indicates that technological changes were made as a routine matter in a constant effort to reduce costs and to improve competitive positions. Increases in wage rates, it is pointed out, did not immediately stimulate technological changes, although in the long run they undoubtedly speeded up the rate of their introduction. The principal inducements to the introduction of new machines or processes were said to be savings on various costs—overhead, labor, or materials—and more importantly, improvement in the quality of the product. Recent improvements in paper machinery are declared to have tended principally to speed up operations. Although this has reduced labor costs somewhat, its effect on overhead costs per ton of paper, according to the study, has been by far the most significant result. The timing of the introduction of new machines was in several instances planned to minimize labor displacement, as in the introduction of certain shoe machinery, the monograph says.

Defense Board Offers Training Bulletin

Washington

• • • The Government's training-within-industry program is explained in terms of placing greater responsibilities on the shoulders of junior industrial executives and supervisory men in two bulletins released by Sidney Hillman, head of the National Defense Advisory Commission.

Main features of the program whose keynote is the planned development of all supervisory agents include emphasis on qualities of leadership; company policies in the field of industrial relations; delegation of sufficient authority to responsible executives; planned transfers and rotations in office, and other points.

The second bulletin emphasizes the necessity for maintaining a reserve pool of trained supervisors. Eight to ten weeks is the estimated time required to select and train supervisors through what is described as four stages of elementary supervision.

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MASTER  GAGEMAKERS
NITRIGAGES

Fatigue Cracks

—BY A.H.DIX—

Merman Plugs Zinc

• • • In her new hit, *Panama Hattie*, Ethel Merman sings, "All the same, I'm in the pink, my constitution's made of zinc." A nice plug it is for N. J. Zinc, but in justice to the other corrosion-resisting metals the line ought to be changed at intervals. As substitutes we suggest, "All the same, I still am painless, my constitution's made of stainless," and "All the same, I'm feeling swell, my constitution's pure Monel."

We had a little trouble with aluminum, but this might do, "All the same, my health is voluminous, because my insides are wholly aluminous."

Fruitfly Speck

• • • An ad of the Bennett Fireplace Co., Norwich, N. Y., contains the slogan, "Authorities on Fireplaces Since 1923." Bill ("On the Assembly Line," see page 52) Sherman says, "Maybe they grow old quickly in this business."

Age is relative. In the fireplace business 17 years may seem like an eon. Remember, Bill, that the giant squid is still a young squirt at the century mark, while the drosophila is an old man at age 24 hours, and the day after his birth can be found regaling his great-grandchildren with tales of what a heller he was in his prime 'way back yesterday about noon.

Good Head

• • • Speaking of topshelf headlines, an orchid to the Danville, Va., evening newspaper deskman who managed to inject Thanksgiving Day spirit into the war news with this, "Turkey Frowns on Axis Moves."

Foreign Languages Dept.

"Victor," he said in Italian.

—Page 99, December *Esquire*

Give us two more syllables so we can be sure he isn't speaking Greek.

What Happened to Jones

• • • Someone sends us a clipping of page 61, Nov. 14 issue, showing a photograph of a lathe cutting a groove in a steel casting. On the lathe is chalked, "Jones is absent again."

Our anonymous inquirer wants to know (1) who Jones is, (2) why he was absent, and (3) was he fired when he got back. The inquiry is justified, for good journalism demands that curiosity never be left unsatisfied. L'affaire Jones should have been explained in the caption, and we would be glad to fill the breach, but we don't even know in what plant the photograph was taken.

If you have a lathe operator named Jones who was absent the day his lathe was cutting a $\frac{1}{2}$ in. groove in an 0.40 carbon steel casting, 11½ in. dia., feed per revolution 0.020 in., cutting speed 57 r.p.m., 170 ft. per min., please give us the lowdown. If we run it we will mark it "Confidential."

Time On Her Hands

• • • Now that the recent campaign is history, we can consider dispassionately the newspapers' treatment of the issues involved. Vigorous is the word for it, with sporadic instances of unfairness. But with the heat of battle cooled to voting booth temperature, all trespasses can be forgiven except this item in the Pro-Roosevelt *New York Evening Post*:

WILLKIE FANS MEET; ONE MINUS A WATCH

Miss Lee C., 23, of W. 80th St., met Miss Sydney M., Ardmore, Pa., at a Willkie rally in Manhattan last Friday. Later they attended a party in E. 50th St., where Miss M. was visiting.

That's all there was, except that full names were given. You will notice that nothing definite is said; no accusations are made, but the reader's curiosity is brought to the critical point and is then left to wander off in God knows doubtful alleys. Dirty Journalism we call it.

Where North Is Down

• • • You have to have some Irish in you to get the meaning of the fifth line in the "chune," "Drill, Ye Tarriers, Drill" (see Bullard ad, page 49, 10/24 issue)—"He married a great big fat far down."

In the South of Ireland those in the North are usually referred to as "far downs." Your Pat evidently married a fat one.

—Michael Dooley

Therblig Tracked to Lair

• • • Therblig first smote our eyes in these pages about a year ago. It appeared in an article on motion study, and is a unit of measurement used in that science. We had a vague idea that it was coined by a linotype operator with a hangover or by a lisper with a head cold, but now learn that it is simply the name of one of motion study's fathers, the late Frank Gilbreth, spelled backward, with a reversal of the last two letters to make it pronounceable.

Sheets Without Shimmy

• • • To keep abreast of the times we go through your f. f. j. carefully each week, but occasionally are thrown for a loss on the fifth down. One of the times was when we read a recent news item headed, "New Test Method for Stainless Steel." It started out safely with the observation by Dr. Lyman J. Briggs, director of the Bureau of Standards, that stainless steel is very resistant to corrosion, of which there can be no possible doubt, no possible doubt whatever. But then it followed up with:

"A test specimen of many pieces stacked side by side in playing-card fashion, cemented together and supported to prevent lateral buckling, was described by bureau engineers as making possible the testing of steel sheets 0.002 in. in thickness under a load of 110 tons per sq. in."

That's where we bogged down. We lie awake nights trying to figure out what that proves with the sheets supported to prevent buckling. When the brains department gets the big Annual out of the way we will see if we can find out what it all means.

Editors on Day and Night Shifts

• • • The Annual, by the way, which will be out in five weeks, will be to coin a cliché, an epoch-maker. The brains department is as busy as a C 1 manufacturing plant with a million-dollar ordnance contract. We hear that a flock of brand new ideas in industrial publishing will be released in the big book.

Trouble With Our Irons

• • • "... the church on Madison Ave. and 36th St., just a No. 2 iron shot from here. . . ." So read an item that appeared here Nov. 14. Your favorite family journal's general manager, Charles Samuel Baur, who also shoots in the low hundreds and who is a stickler for accuracy, blue pencils the item and adds, "And what else?"

A drive, a No. 5, three putts, and one gimme.

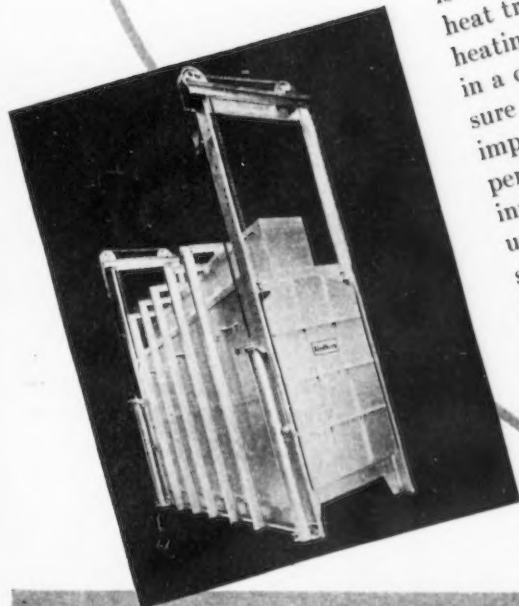
Problems

• • • A solution of this in four minutes gets you an A on your report card:

A wine merchant has 21 casks. Seven are full of wine, seven are half full and seven are empty. He wishes to divide the wine among three stores, A, B, and C, without transferring any wine from one cask to another, so that each store will receive an equal amount of wine, and also an equal number of casks. How can he do it?

Over 90% of North America's leading aircraft manufacturers now use LINDBERG Cyclone Tempering Furnaces!

YES, it is significant that 9 out of 10 leading North American aircraft manufacturers use Lindberg Cyclone Tempering Furnaces... for today, more than ever, both commercial and defense aviation demand, in heat treating, the utmost in accuracy, control, and speed. Increasingly important has become military accuracy in swift mass production. For this reason aircraft manufacturers everywhere look to Lindberg for tempering accuracy—for well they know that each and every portion of every charge, whether it be landing gear forgings, aluminum sub-assemblies, or the smallest rivet, must be heated to precisely uniform temperatures if the peak of strength is to be reached. * The secret of the Cyclone's tremendous success in heat treating aircraft parts is in the unique Cyclone forced convection heating principle by which great volumes of air are accurately heated in a chamber separate from the work chamber and forced under pressure at 2-mile-a-minute velocity to all parts of the charge—making it impossible for temperature differences to exist. * Supplementing temperature uniformity, the Lindberg Control accurately apportions heat input, eliminating heat supply surges or deficiencies, and the resulting undesirable jagged control curves. * Where high military accuracy in swift mass production is demanded, you can definitely depend on the Lindberg Cyclone Tempering Furnace. A special bulletin, "Heat Treating Furnaces for the Aircraft Industry," has been prepared and is available on request. Lindberg Engineering Company, 228 North Laflin St., Chicago.



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FOR ACCURACY

LINDBERG FURNACES

CYCLONE FOR TEMPERING • HYDRIZING FOR HARDENING

News of Industry...

Canada Bans New Car Models Until War Ends; All Tools to Arms Plants

Ottawa

The Canadian Government is taking more drastic action in its effort to supply the ever-increasing sinews of war. One of the most important steps so far taken in this direction was revealed in the House of Commons Nov. 20 by C. D. Howe, Minister of Munitions and Supply. Mr. Howe said that the making of new models for automobiles, refrigerators, cooking equipment, radios, vacuum cleaners and typewriters is prohibited for the period of the war in order to enable tool makers to concentrate upon the essential job of manufacturing jigs, dies and molds which are essential in war industry. "Existing models in current use in Canada will thus be frozen," he said. "No change will be permitted except for good and sufficient reason and then only under permit from the Machine Tool Controller."

Mr. Howe declared that the next eight months would witness a more rapid expansion of employment and at the end of that period Canada should be producing the practical maximum of war materials of which the country is capable. He confirmed earlier reports that a War Time Requirements Board, composed of supply controllers and bureau chiefs has been established. The purpose of the board is to establish plans so that materials, power, manufacturing plants and transportation facilities will give priority to war needs over the requirements of ordinary industry. The new board is composed of H. R. MacMillan, chairman; Dr. W. C. Clark, Deputy Minister of Finance; Graham Towers, governor of the Bank of Canada; Dr. Bryce Stewart, Deputy Minister of Labor; R. A. C. Henry, director-general of economics in the Supply Department; Maj.-Gen. L. B. Lafleche, Col. G. S. Currie, Lt.-Col. K. C. MacLachlan, Deputy Minister of

Naval Affairs; H. G. Colebrooke and Carl Goldenberg, secretary.

The Minister further stated that shells ranging from 40 mm. to 9.2 in. are now being produced in Canada and productive capacity is being increased to 2,000,000 shells per month. Arrangements have been made for the manufacture of guns and gun carriages in Canada of the following types: Bofors, AA guns, 3.7 anti-aircraft, 25-pounders, Browning aircraft machine guns and tank machine guns, 2 pounders anti-tank, 6 pounders for tanks, 4 and 6-in. naval guns, 12 pounders and Lee Enfield rifles.

Mr. Howe also announced that negotiations have been completed for construction in Canada of 18 large merchant vessels for the British Government. He said these will be built in shipyards on the St. Lawrence River and the Pacific Coast. Contracts are in process of being awarded.

Snow Plows Among Canada's War Equipment

Ottawa

... A HUGE ARRAY of modern snow-fighting equipment already has gone into action on most of the 81 airports across the Dominion to cope with early snowfalls. Powerful blowers, plows, rollers and drags are being employed to maintain airports and landing fields in good condition throughout the winter, and to minimize interference with the vast training program now underway.

Purchases made by the Department of Munitions and Supply in preparation for the battle with Old Man Winter, have included 48 huge snow blowers, 92 trucks equipped with plows, 93 sets of snow rollers, 93 drags, four sidewalk plows and 129 large sleighs used in carrying away accumulated snow.

Announcement is made here that the St. Malo shops of the Canadian National Railways have been taken over by the government and are being remodeled and extended with a view to incorporating them in the Dominion government's arsenal system at Quebec City.

Speaking in the British Columbia Legislature at Victoria, B. C., Hon. W. J. Asselstine, Minister of Mines, stated that the government is making studies of the possibilities of establishing a copper smelter and iron and steel plant in that province. Correspondence relative to these projects is of a confidential nature, he stated. From other sources it was learned that the possibility of installing a blast furnace as a first step toward the eventual construction of a large steel works is being seriously discussed by industrial and government officials.

Department of Munitions and Supply announced placing of 2518 orders having total value of \$7,863,000. Awards include orders valued at \$146,771 to United States companies. The more important orders follow:

Mechanical transport — Ford Motor Co. of Canada, Ltd., Windsor, \$400,000; General Motors of Canada, Ltd., Oshawa, \$383,230; War Office, England, \$278,973; National Steel Car Corp. Ltd., Hamilton, \$136,710; Western Steel Products Corp., Ltd., Ottawa, \$58,125.

Aircraft — G. H. Wood & Co., Ltd., Ottawa, \$48,206; MacDonald Brothers Aircraft, Ltd., Ottawa, \$36,680.

Electrical equipment — Canadian General Electric Co., Ltd., Ottawa, \$55,892; Northern Electric Co., Ltd., Ottawa, \$25,578; Amalgamated Electric Corp., Ltd., Toronto, \$42,331; Chadwick Carroll Brass & Fixtures, Ltd., Hamilton, \$43,760.

Machinery — E. W. Bliss Co. of Canada, Ltd., Toronto, \$81,300.

Instruments (technical) — Ontario Hughes-Owens Co., Ltd., Ottawa, \$121,123.

Miscellaneous — General Steel Wares, Ltd., Ottawa, \$61,500.

October Scrap Prices 5% Below Year Ago

• • • Although domestic consumption of iron and steel scrap set a new high record in October, the average price remained about 5 per cent below October, 1939, due to the voluntary cooperation of the scrap industry with the national defense council, it was stated by Edwin C. Barringer, executive secretary of the Institute of Scrap Iron and Steel, Inc.

Domestic consumption in October is estimated by the institute at 4,233,000 gross tons, compared with 3,876,000 tons in September, and 3,809,000 tons in October, 1939.

In the first 10 months of 1940, consumption has totaled 33,815,000 tons, 37 per cent more than in the comparable period of 1939 and, in fact, exceeding the 32,434,000 tons melted in the entire year 1939.

"Many times in the past when domestic consumption was far lower than today scrap prices have been measurably higher," said Mr. Barringer. "The scrap industry is sympathetic with and is cooperating fully with the defense council in attempting to prevent an upward spiral of prices."

History of Alabama Stacks By Woodward Iron

Birmingham

• • • "Alabama Blast Furnaces," published by Woodward Iron Co., here, has come off the press. The 162-page book gives the history of each of the 77 blast furnaces that have been built and operated in Alabama since 1815 and also gives the history of four more furnaces that were either partially completed or, if completed, were never operated.

Batt, Henderson to Address Annual Scrap Convention

• • • A forum on national defense activities will feature the annual convention of the Institute of Scrap Iron and Steel Inc., at Baltimore, Jan. 7-8-9. Leon Henderson, commissioner of the price stabilization division, and W. L. Batt, deputy commissioner of the industrial materials division, of the National Defense Advisory Council, will address the convention on the price and supply aspects, respectively, of the defense program.

Federal Reserve Bank to Aid in Spreading Work

Pittsburgh

• • • SMALL AND MEDIUM SIZED industries which have not received invitations to bid on national defense work, will be assisted in their attempt to share in such work by the various Federal Reserve Banks and their 24 branches.

All banks in the Federal Reserve districts have been requested to furnish information which will assist smaller enterprises in obtaining defense contracts and to aid them in obtaining such financial assistance as may be required in the execution of defense orders.

In each of the 12 Federal Reserve Banks and the 24 branches, an officer has been designated to serve as the field representative of the director of small business activities and of the board of governors.

R. B. Hays, Federal Reserve Bank, Cleveland, is field representative in the fourth Federal Reserve district, and B. J. Lazar, Cincinnati branch, and P. A. Brown, Pittsburgh branch, have also been named representatives of the National Defense Advisory Commission.

Barium Steel To Sell Stock, Install Furnaces

Canton, Ohio

• • • Barium Stainless Steel Corp., Canton, has filed with the SEC for registration of 250,000 shares of \$1 par common stock to be offered at the market. Tobey & Co., of New York, and Johnson, Lemon & Co., of Washington, are the underwriters. Proceeds will be used to repay an RFC loan, instal two furnaces at the Canton plant and add \$158,652 to company's net working capital.

Coming Events

Dec. 2 to 7—National Exposition of Power and Mechanical Engineering, New York.

Dec. 9 to 13—National Association of Manufacturers, annual meeting, New York.

New Corporation Will Operate Ordnance Plant

Cincinnati

• • • Naval ordnance contracts of a substantial character will be filled by the General Machinery Ordnance Corp., a wholly owned subsidiary of the General Machinery Corp., Hamilton, Ohio, it was announced last week.

The new corporation, capitalized at \$200,000, is headed by George H. Houston, former president of Baldwin Locomotive Works, Philadelphia, and a native of Covington, Kentucky, and will operate at Charleston, W. Va., in an ordnance plant built during the World War by the Navy Department.

The nature of the contracts and the quantity were not disclosed, being military secrets. It is stated, however, that a large number of men will be employed. A. O. Weilan, former general manager of the R.C.A.-Victor Corp., will be general manager and George A. Rentschler, president of General Machinery, chairman of the board. Charles D. MacGillvray, Philadelphia, former treasurer of the Baldwin Locomotive Works, will be secretary and treasurer of the new corporation. The plant was recently rehabilitated by the Navy Department and operations have already begun, it was stated.

A.F.A.'s 1941 Convention To Be Held in New York

• • • New York has been chosen by the board of directors of the American Foundrymen's Association as the 1941 convention city. The dates selected are May 12, 13, 14 and 15. This will be the first convention of A.F.A. to be held in New York since 1905 and the first held in the East since 1934. There will be no exhibits.

Timken Roller Bearing To Add 15,000 Sq. Ft.

Columbus, Ohio

• • • A permit has been granted for the construction of a \$40,000 addition to the plant of the Timken Roller Bearing Co., here. The addition will be a one-story structure with a flat roof and will be constructed of brick and steel. The building will provide 15,000 sq. ft. of additional floor space.

Ordnance Plants May Be Built in Pittsburgh Area

Pittsburgh

••• Reports persist here that the Government will soon complete negotiations for construction of ordnance plants to be erected somewhere in the Western Pennsylvania industrial area for the manufacture of armaments. Neither the War Department nor Westinghouse Electric & Mfg. Co. will confirm nor deny that such a plan exists but it is expected that one or more plants will definitely be built and will be operated under the direction of the Westinghouse company.

Westinghouse recently set up an emergency staff to advise on plant operations involving national defense work. Personnel changes have been made recently which resulted in the shifting of key production officials to this emergency staff which will direct and operate armament work held by or assigned to the Westinghouse Electric & Mfg. Co.

Bendix-Westinghouse Building a New Plant

Elyria, Ohio

••• Work has begun here on the construction of a new plant and offices for the Bendix-Westinghouse Automotive Air Brake Co., according to R. L. Morrison, vice president and general manager. Bendix-Westinghouse has been occupying part of the plant of the Westinghouse Air Brake Co. at Wilmerding, Pa., near Pittsburgh, but need for more space led to the expansion move. Foundation and structural work is expected to be completed the latter part of January.

New Company Producing A Lapping Machine

Detroit

••• Organized recently, Ultra-Lap Machine Co., 255 McDougall Avenue, Detroit, has developed a lapping machine for flat surfaces which has been just put into production. Officers are N. Walker, president; B. C. White, for 20 years with the Gear Grinding Machine Co., of the Norge Division, Borg-Warner Corp., as secretary, and C. B. Swift, treasurer.

C. C. Carlton Heads New Automotive Air Defense

C. C. Carlton has been named permanent director of the Automotive Committee for Air Defense, which established headquarters three weeks ago at 8505 W. Warren Avenue in the Graham-Paige plant. Mr. Carlton has been serving as acting director.

At Mr. Carlton's request, William J. Cronin, secretary of the manufacturers committee of the Automobile Manufacturers Association, has been loaned to the Air Defense group as assistant director.

Major James H. Doolittle is serving as representative of the U. S. Army Air Corps, cooperating with the automotive group.

Principal function of the new committee is to bring together for the aviation industry new sources of supply for parts and sub-assemblies from among the hundreds of concerns in the automotive field. The committee is composed of representatives of the automobile, trucks, body and parts manufacturers. It was organized Oct. 25 at the request of William S. Knudsen, National Defense Advisory Commission. Currently it is studying aviation construction methods and analyzing existing automotive facilities. Its exhibit of aircraft parts which will be manufactured in automotive plants has been visited by nearly 500 representatives of manufacturing concerns.

Management Society to Discuss Current Topics

Commemorating the 25th anniversary of the death of Frederick W. Taylor, pioneer in scientific management, the Society for Advancement of Management will meet in a two-day conference session at Hotel Pennsylvania in New York on Dec. 5 and 6. The society (formerly the Taylor Society and the Society of Industrial Engineers) will devote the conference to a study of "The Problems of Business Management and Public Administration in A Period of Industrial Preparedness," according to Myron H. Clark, president, who will preside at the opening session devoted to national problems of accelerated production.

Calendar for Metal Working Apprentices

Desplaines, Ill.

••• Continental Machines, Inc., and its subsidiary, The Doall Co., will issue a 1941 calendar aimed at helping in the training of young men for the metal working industry. Each page of the calendar will deal with some phase of machine tool and metal working operations. Thus, the calendar will comprise a series of 12 lessons for apprentices and students. The calendars will be distributed throughout National Youth Administration schools, CCC camps, YMCA schools, trade schools and apprentice shops.

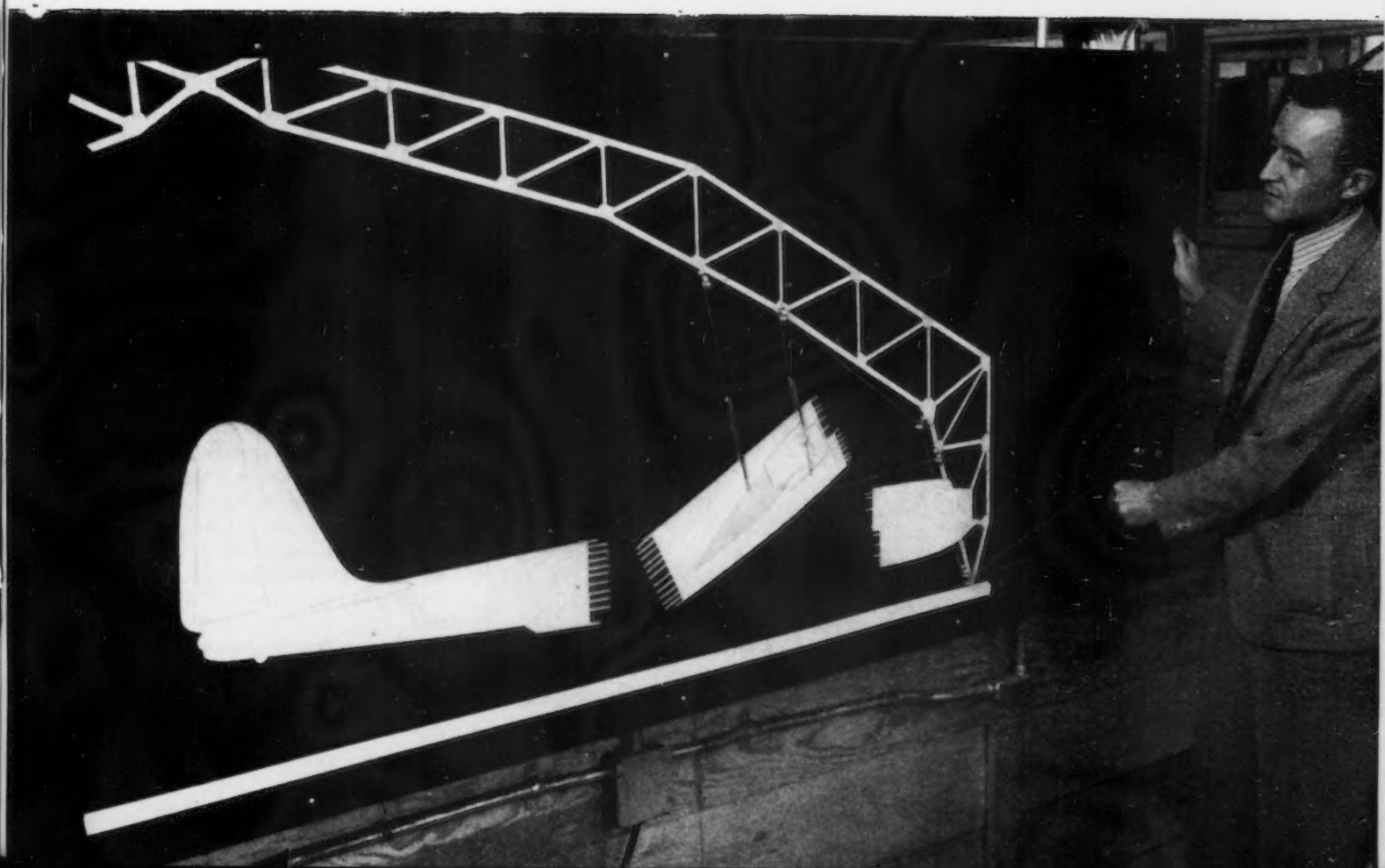
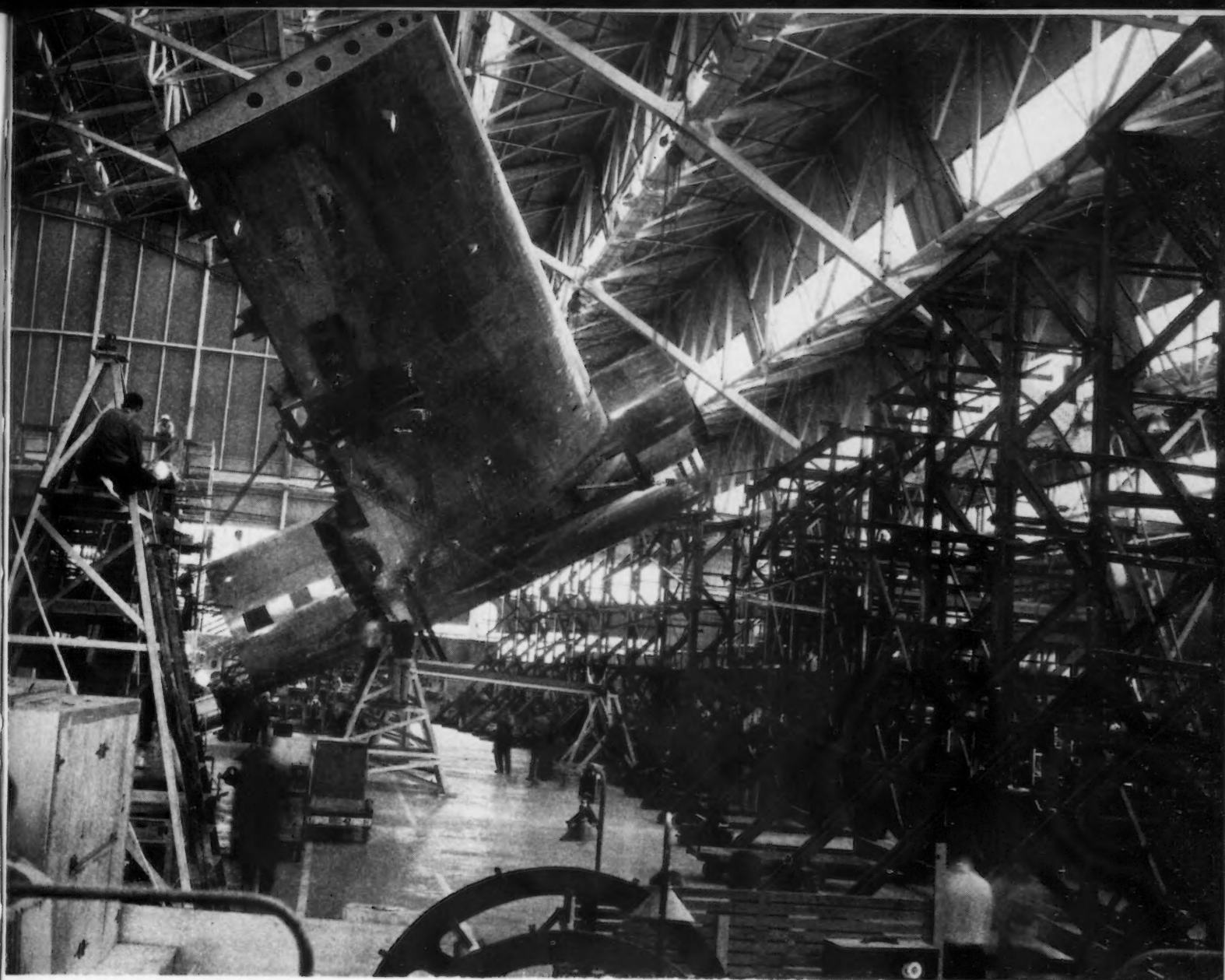
BUILDING A SUPER BOMBER

—Recently Bethlehem Steel Co. bridge building experts assisted Douglas Aircraft Co. engineers in working out methods for turning the B-19 Douglas Super Bomber's wing sections from a vertical position to the horizontal for assembly with the nose and tail section. The lower view on the opposite page shows Basil Bybee, Douglas engineers, using a profile model to demonstrate joining of the B-19's three sections. Shown at the top is the job actually being done, with the B-19's wing and fuselage center section being lifted from its great steel jig.

Ford's Village Industries Soon Will Total 18

Detroit

••• Two new units of Ford Motor Co.'s string of village industries within 50 miles of the Ford Rouge plant will be ready for production before Jan. 1, the company has announced. One is the Willow Run plant, two miles east of Ypsilanti, which will manufacture door and ignition locks for Ford cars. At Manchester, Mich., a plant to assemble automotive instrument panels "clusters" will be operated. The two units bring the number of such plants to 18.



E. L. Solomon Head of Pittsburgh Scrap Chapter

Pittsburgh

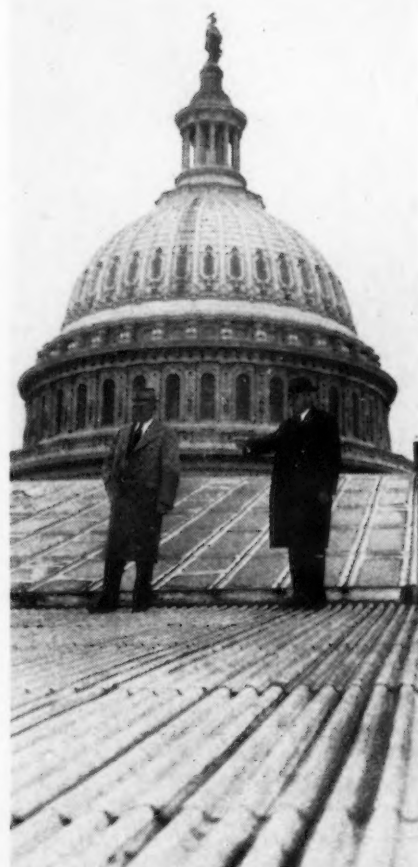
••• Following talks by Edwin C. Barringer, executive secretary of the Institute of Scrap Iron and Steel, and J. E. Jacobson, president, in which they covered salient points discussed by steel, scrap, and government officials at Washington recently, the Pittsburgh chapter of the institute elected officers as follows: President, E. L. Solomon, Max Solomon Co.; vice-president, D. L. Wilkoff, David L. Wilkoff Co.; secretary, Homer F. Stocker, H. F. Stocker & Co.; treasurer, Herman Caplan, M. W. Singer & Co. The executive committee is as follows: Chairman, Amos Bowman, Luria Brothers & Co., Inc.; Harry N. Cohen, Butler Iron & Steel Co.; Abe Cohen, Fort Pitt Tool & Supply Co.; H. N. Trimble; L. W. Landey, M. N. Landey Co.; Robert Amper, Robert Amper Co.; Hugh Ruffner,

Wellsville Iron & Metal Co.; W. L. Behm, United Iron & Metal Co.; and J. R. McNamee, Briggs & Turivas.

Motor Procurement Office Moved to Fort Wayne

Detroit

••• Removal of the Quartermaster Corps, Motor Procurement Planning Office, from the Federal Building in Detroit to Fort Wayne, has been announced by Lieut.-Col. Edward H. Besse, commanding officer at the post. In charge of the office at Fort Wayne is Major Clarence E. Jones, who also becomes executive officer of the post. He will be second in command to Col. Besse. Fort Wayne recently was made Quartermaster Motor Supply Depot and now has 203 enlisted men and 123 civilian technicians engaged in the automotive parts procurement program for the Army.



NATION'S CAPITOL NEEDS NEW ROOF. With all of the billions that are being spent in Washington, it appears that the roof of the nation's capitol has been overlooked. David Lynn, the architect of the Capitol, who examined the roof recently, said that the safety of the country's legislators has been endangered. The roof was condemned some time ago, Mr. Lynn stated. (Read "The Capital Roof," page 25.)

HILLSIDE FLUOR SPAR MINES
 38 SOUTH DEARBORN STREET CHICAGO, ILL.
 MINES IN ILLINOIS AND KENTUCKY

Bullard Lifts Wages, Salaries, 10% for 2000

••• Bullard Co., Bridgeport, Conn., has increased wages and salaries, including officers', 10 per cent beginning the week of Dec. 21. The company has slightly more than 2000 employees. In addition, the directors have voted a bonus equal to 40 hr. of wages at the rate prevailing Dec. 6 to all employees continuously employed from Jan. 2 to Dec. 17, this year, and half that amount for those continuously employed from May 31 to Dec. 17, this year. Others will receive \$5 each.

Wage Rise of 5c. Per Hr. To Cost \$580,878 a Year

Cleveland

••• A wage increase of 5c. per hr., recently granted to all non-supervisory factory employees by Thompson Products, Inc., aircraft partsmaker here, actually will cost \$580,878 more per year, better than one-third of the company's nine-months' earnings. The company breaks down the cost as follows:

Five cents per hour for 4000 workers for 2000 hours per year	\$400,000
Provision for overtime on a 41½-hr. week for one year	127,000
6 per cent extra compensation on increase and overtime premium will cost	31,620
3 per cent unemployment insurance premium on increase and overtime premium will cost ..	16,758
1 per cent old age benefit tax on increase and overtime premium will cost	5,500

Total estimated annual cost of wage increase\$580,878

The company's 6 per cent extra compensation plan is for employees having a year or more of service.

Sales of Cars and Trucks Set An October Record

Detroit

Retail sales of cars and trucks in the United States set a new record for October of 380,182 units, boosting the 10 months' total this year to 3,325,135 units, 27 per cent above the same period in 1939.

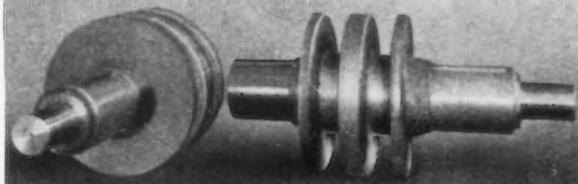
Passenger car sales are up 28 per cent and commercial vehicle sales up 19 per cent over last year.

Curtiss-Wright To Train Men For New Plant

Columbus, Ohio

••• The Curtiss-Wright Corp. has made an agreement here with the State Department of Agriculture to occupy tentatively one of the buildings on the State Fair Grounds where men will be trained for work in the new airplane factory which is expected to start operation at the airport early next summer.

Forged carbon steel sprocket shaft produced by Standard. Diameter 2' 11"; length 5' 11¼"; weight 5160 pounds.



Cast steel runner supplied by Standard Steel Works for an I.P. Morris Hydraulic Turbine.



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Won't you discuss your requirements with us and let us advise you how Standard can help?

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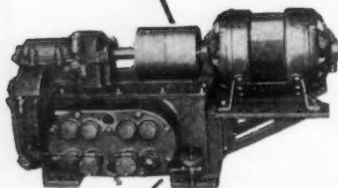


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Type "N" Compressor

Two cylinder, single-stage, single acting, gear driven. Air-cooled for intermittent operation, "NB"; water-cooled cylinder heads for continuous operation, "NWB". Has positive and reliable unloader for A.C. motor drive. Sizes 12½ to 100 cu. ft. Pressures from 30 to 150 lbs. Catalog T2048. Write for information and prices.



Many other types and sizes available, up to 200 cu. ft. . . . There is one in this extensive line to meet your specific needs.

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Westinghouse . . .
AIR BRAKE CO.
Industrial Division
PITTSBURGH, PA.

Billion Dollars of Defense Work Underway

Washington

• • • A National Defense Advisory Commission analysis of the \$2,000,000,000 defense construction program showed last week that of the total amount of expenditures called for under present legislation more than \$1,000,000,000 worth of work is under way. This includes troop quarters, air and naval stations, plant facilities for manufacturing airplanes, tanks, ammunition and other military supplies, and facilities for the construction of ships and other defense equipment.

The breakdown, which officials said was the first of a series of analyses to cover various phases of the expanded defense program, follows:

\$631,000,000 for trainee shelters—includes shelter for the National Guard, the expanded regular Army, increased quarters for Navy personnel and trainees recruits under the selective service program. Constructed largely of wood, a majority of the shelters will be completed within the next few months.

\$520,000,000 for productive facilities—includes airplane and engine plants, armor, tank, ammunition and loading plants, shipways and shipyard facilities. This is exclusive of plant expansions and new plant construction, estimated to cost \$330,000,000 this year, to be financed with private funds. Also RFC has authorized loans

totaling \$175,000,000, of which \$154,000,000 went to companies making aircraft and related products.

\$337,000,000 for air bases—includes hangars, shops, administration buildings, and utilities at Army and Navy air bases. This will be spread over a longer period than the shelter construction program.

\$258,000,000 for other military construction—includes sea coast defenses and construction at military and naval stations other than air bases.

\$240,000,000 for defense housing—includes land cost and is expected to provide for 65,000 of the 70,000 dwelling units necessary for defense workers and families of enlisted men. About \$100,000,000 appropriated to the Army and Navy for defense housing has been allocated and construction is under way on thousands of units.

Preliminary planning and design studies call for construction of the remaining \$140,000,000 for defense workers with the bulk of the work to be done during 1941.

This breakdown does not take into consideration other direct appropriations or contract authorizations under the supervision of other government agencies. The Civil Aeronautics Authority, for example, has \$40,000,000 for civil airports. The WPA spends a similar sum annually for construction work on airports and airways. The Panama Canal has authority to install an extra set of locks.

MADE FOR NORWAY—This new, fast Douglas 8A-5 attack bomber, originally ordered for Norway, is now being delivered instead to Canada. The plane is powered with a 1200 hp. Wright Cyclone engine, has a top speed in excess of 265 mph., carries seven machine guns and a bomb load.



General Electric Workers To Share \$8,000,000

Schenectady, N. Y.

••• For 1940, a total of approximately \$8,000,000 will be added to the regular earnings of about 66,000 General Electric employees who are eligible to participate under the company's general profit sharing and cost-of-living adjustment plans, Charles E. Wilson, president, has announced. The corresponding total for 1939 was \$5,019,000.

Based upon an estimate of the company's net income for 1940, about \$4,500,000 will be available for distribution to employees as general profit sharing, and they will receive an additional \$3,500,000 as a cost-of-living adjustment of their earnings. The corresponding amounts for the year 1939 were \$2,566,000 and \$2,453,000, respectively.

Mr. Wilson stated that the General Electric Co. now has a total of about 82,000 employees on its payroll, or 15,000 more than a year ago, not including employees of affiliated companies.

Cast Iron Pipe Output 1,257,130 Tons in 1939

Washington

••• Production of cast iron pipe and fittings reported to the Bureau of the Census rose to 1,257,130 net tons, valued at \$67,929,555 in 1939 from 1,098,413 tons, valued at \$58,363,210 in 1937. The value of the quantity not reported was \$1,500,257 last year and \$7,848,652 in 1937. Pipe production was valued at \$45,485,432 and \$39,989,349, respectively. Of the 1939 output 425,189 tons was cast by the centrifugal process, compared with 346,644 tons produced by that process in 1937.

Soil and plumbers' pipe fittings separately reported totaled 117,166 tons, valued at \$7,238,587 and 102,280 tons, valued at \$6,244,555; gas and water pipe fittings, 33,016 tons, valued at \$3,244,972 and 29,070 tons, valued at \$3,124,842; other cast iron pipe fittings (screwed, flanged, etc.) and those not reported separately, 103,311 tons, valued at \$11,960,564 and 72,686 tons, valued at \$9,004,464.

WE MUST MAKE POWDER PUFFS AND AIRPLANES



Defense must come first . . . but at the same time we must satisfy the normal wants of our people.

Absorbed as we are today in making tanks, destroyers and planes, we must be mindful of the needs of Mr. and Mrs. Average Consumer and the time when normal conditions prevail . . . when peace comes.

We can do both. America has never had a single-track mind. Versatility is in our bag of tricks.

Many of our normally consumed products are required by the Army and the Navy . . . socks, shirts, cigarettes, razors and a mile-long list of so-called consumer goods. This keeps many industries busy.

Furthermore, the accelerated production of munitions for defense puts more money in the hands of our workers. Here's buying power that must be satisfied and kept satisfied. Milady wants powder puffs. Uncle Sam wants airplanes. Let's make both.

Geo. T. Trundle Jr.

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Consulting Management Engineering

General Offices

CLEVELAND • BULKLEY BUILDING

CHICAGO

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208 South La Salle Street

NEW YORK

Graybar Building
420 Lexington Avenue

Government Awards . . .

Government awards for the week ended Nov. 16, as listed by the Public Contracts Division, Department of Labor, follow:

Iron and Steel Products:

Acme Steel Eng. Co., Baltimore, Md.; buoys, \$86,765.

Air Associates, Inc., Bendix, N. J.; stand assembly, \$65,550.

American Steel & Wire Co., Philadelphia; steel, \$24,457.

Armstrong Bros. Tool Co., Chicago; motor maintenance equipment, \$28,259.

Barco Mfg. Co., Chicago, Ill.; hammers, \$17,154.

Bethlehem Steel Co., Bethlehem, Pa.; bar steel, \$36,938.

Carnegie-Illinois Steel Corp., Washington; steel bars, \$16,334.

Case Crane & Kilbourne Jacobs Co., Columbus, Ohio; food carts, \$255,525.

Chapman Valve Mfg. Co., Indian Orchard, Mass.; valves, \$12,515.

Chicago Bridge & Iron Co., New York City; steel tanks, \$11,760.

Columbian Steel Tank Co., Kansas City, Mo.; steel buildings, \$37,279.

Commercial Shearing & Stamping Co., Youngstown, Ohio; brackets, \$126,000.

Crescent Tool Company, Jamestown, N. Y.; wrenches, \$50,621.

Cyclone Fence Co., Waukegan, Ill.; wire cloth, indefinite.

Desmond Stephan Mfg. Co., Urbana, Ohio; motor maintenance equipment, \$41,741.

Doehler Die Casting Co., Pottstown, Pa.; practice bombs, \$48,074.

Flour City Ornamental Iron Co., Minneapolis; bridge equipment, \$1,169,610.

Hanson-Whitney Machine Co., Hartford, Conn.; die-tap, \$11,209.

Hobart Brothers, Troy, Ohio; welding outfits, \$74,925.

Igoe Brothers, Inc., Brooklyn, N. Y.; wire nails, \$38,977.

Inland Steel Co., Chicago; plate steel, \$26,259.

International Engineering, Inc., Dayton, Ohio; stand assembly, \$24,744.

Kay Mfg. Corp., Brooklyn, N. Y.; wire bottoms, \$13,500.

Merando Co., Inc., Washington, D. C.; storage buildings, \$59,995.

Alexander Milburn Co., Baltimore; cups, torches, \$30,549.

National Tube Co., Washington; bombs, \$206,139.

Norris Stamping & Mfg. Co., Los Angeles; ammunition boxes, \$848,812.

Paulson Tools, Inc., Wallingford, Conn.; chisels, \$25,265.

Peck, Stow, & Wilcox Co., Southington, Conn.; motor maintenance equipment, \$32,303.

Phoenix Bridge Co., Phoenixville, Pa.; structural steel, \$14,045.

Plomb Tool Co., Los Angeles, Cal.; wrenches, \$33,809.

Fayette R. Plumb, Inc., Philadelphia; hatchets, \$15,202.

C. J. Rinear & Co., Inc., Philadelphia; elbows, \$26,578.

Snap-On Tools Corp., Kenosha, Wis.; motor maintenance equipment, \$47,709.

Stewart-Warner Corp., Chicago, Ill.; practice bombs, \$23,688.

Struthers Wells, Titusville, Pa.; forgings, \$20,928.

Union Twist Drill Co., S. W. Card Mfg. Co., Div., Mansfield, Mass.; die-tap, \$13,046.

United States Steel Export Co., Washington; structural steel, \$13,647.

Valley Iron Works, Inc., Yakima, Wash.; tracks, \$17,500.

Viking Construction Corp., New York City; piping, \$203,740.

Vollrath Co., Sheboygan, Wis.; hospital buckets, \$13,488.

Walworth Company, Inc., New York; wrenches, \$19,638.

Widin Metal Goods Co., Garwood, N. J.; pike, wire, \$11,640.

Wire Rope Corp. of America, Inc., New Haven, Conn.; wire rope, \$28,472.

Zimmer Splint Co., New York City; litters, \$155,200.

Other Machinery:

Addressograph-Multigraph Corp., Cleveland; addressing machines, \$18,660.

Addressograph-Multigraph Corp., Cleveland; imprinting machines, \$69,800.

American Tool Works Co., Cincinnati; lathes, \$42,098.

American Water Softener Co., Philadelphia; water purif. units, \$29,000.

Austin-Hastings Co., Inc., Cambridge, Mass.; shapers, \$32,425.

Axelson Mfg. Co., Los Angeles, Cal.; lathe, \$13,654.

Brown & Sharpe Mfg. Co., Providence, R. I.; milling machines, \$40,765.

Bucyrus-Erie Co., South Milwaukee, Wis.; dressing machines, \$12,904.

Buda Company, Harvey, Ill.; boring machine, \$117,427.

Caterpillar Tractor Co., Peoria, Ill.; tractors, \$21,031.

Thomas Special Finishes Meet Quality Standards ECONOMICALLY



The finish on cold rolled strip steel is invariably a very important factor and in this respect Thomas is achieving unexcelled results. Thomas electro coated finishes are economically supplied to many manufacturers. The excellent qualities of the coatings frequently eliminate further finishing. They are dependable, and will not crack nor peel during deep drawing and forming operations. . . Let one of our representatives explain how Thomas electro coatings may lower your production costs.



Thomas
Strip

Bright Finish Uncoated
and Electro Coated
With Nickel, Zinc,
Copper, Brass.

THE THOMAS STEEL CO.
SPECIALIZED PRODUCERS OF COLD ROLLED STRIP STEEL
WARREN, OHIO

Caterpillar Tractor Co., Peoria, Ill.; tractors, \$20,562.

Caterpillar Tractor Co., Peoria, Ill.; tractor, \$54,300.

Continental Machines, Inc., Minneapolis, Minn.; machines, \$19,643.

Cooper Bessemer Corp., New York City; engine parts, \$10,667.

Eimer & Amend, New York; centrifuge, \$16,538.

General Motors Corp., Anderson, Ind.; engine pistons, \$17,242.

George Gorton Mach. Co., Racine, Wis.; machines, \$16,589.

C. H. Gosiger Mach. Co., Dayton, Ohio; lathes, \$218,911.

Hardie-Tynes Mfg. Co., Birmingham, Ala.; air compressors, \$47,300.

Hardinge Brothers, Inc., Elmira, N. Y.; milling machine, \$93,192.

Hendey Machine Co., Torrington, Conn.; lathes, \$18,086.

Hussmann-Ligonier Co., St. Louis, Mo.; refrigerators, \$26,010.

Ingersoll-Rand Co., Washington; air compressor, \$15,870.

Koch Refrigerators (Div. of Koch Butchers Supply Co.), North Kansas City, Mo.; refrigerators, \$96,975.

R. K. LeBlond Mach. Tool Co., Cincinnati; rifling machines, \$11,973.

R. G. LeTourneau, Inc., Peoria, Ill.; construction supplies, \$12,104.

Murphy Elevator Co., Inc., Louisville, Ky.; elevator, \$13,400.

Pangborn Corporation, Hagerstown, Md.; blast cabinet, \$32,647.

Paving Supply & Equipment Co., Washington, D. C.; shovels, \$20,581.

Pioneer Air Compressor Co., Inc., New York City; air compressor, \$14,414.

David Round & Son, Cleveland; hoists, \$38,077.

Servel, Inc., New York City; refrigerator, \$10,796.

Sherer-Gillett Co., Marshall, Mich.; refrigerators, \$46,900.

Sherwood Brass Works, Detroit, Mich.; engine parts, \$18,830.

Stewart-Warner Corp., Chicago; engine parts, \$27,465.

Thew Shovel Co., Lorain, Ohio; crane, \$14,840.

Wallace & Tiernan Co., Belleville, N. J.; water purif. units, \$39,235.

Warren Company, Atlanta, Ga.; refrigerators, \$112,200.

Waterbury Farrel Foundry & Mach Co., Waterbury, Conn.; machines, \$15,000.

Waterbury Farrel Foundry & Mach Co., Waterbury, Conn.; machines, \$15,000.

Waterbury Tool Div. of Vickers, Inc., Waterbury, Conn.; bearings, \$13,363.

Yale & Towne Mfg. Co., Philadelphia; hoists, \$38,077.

York Ice Machinery Corp.; coolers, \$55,902.

Nonferrous Metals and Alloys:

Aluminum Cooking Utensil Co., New Kensington, Pa.; stock pots, \$20,343.

Aluminum Goods Mfg. Co., Manitowoc, Wis.; filters, \$16,403.

Aluminum Goods Mfg. Co., Manitowoc, Wis.; pitchers, \$36,895.

Aluminum Products Co., La Grange, Ill.; stock pots, \$54,195.

Aluminum Products Co., La Grange, Ill.; pitchers, \$22,501.

American Brass Co., Waterbury, Conn.; brass, \$42,149.

American Platinum Works, Newark, N. J.; sheet silver, \$62,900.

American Smelting & Refining Co., Denver, Colo.; copper, \$10,232.

Bridgeport Brass Co., Bridgeport, Conn.; cartridge cases, \$135,000.

Henry Moss & Company, Inc., Brooklyn; brass stencils, \$25,458.

Mueller Brass Co., Port Huron, Mich.; brass forgings, \$50,746.

Peter A. Petroff, New York City; casing, \$21,614.

Revere Copper & Brass, Inc., Baltimore, Md.; jacket cups, \$95,500.

Scovill Mfg. Co., Waterbury, Conn.; alloy tubing, \$11,580.

Westclox, Div. of General Time Instruments Corp., La Salle, Ill.; pins, \$14,584.

Navv Department:

American Automatic Electric Sales Co., Chicago; keys, lever, \$5,054.

Acme Machine Tool Co., Cincinnati; lathes, turret, \$82,480.

American Steel & Wire Co. of New Jersey, Washington; cable, electric, \$88,078.

Bausch & Lomb Optical Co., Rochester, N. Y.; telescopes, ship, \$57,280.

Bryant Machinery & Engineering Co., Chicago; drills, \$5,320.

Bishop Wire & Cable Corp., New York; cable, \$13,295.

Chicago Pneumatic Tool Co., Philadelphia; riveters, aircraft type, \$5,695.

Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati; machine, grinding, \$27,440.

Collyer Insulated Wire Co., Pawtucket, R. I.; cable, electric, \$22,063.

Builders Iron Foundry, Providence, R. I.; lathes, deep hole boring, \$62,000.

Circle Wire & Cable Corp., Maspeth, N. Y.; cable, \$7,105.

Clearing Machine Corp., Chicago, Ill.; brake, press, \$14,200.

Collyer Insulated Wire Co., Pawtucket, R. I.; cable, \$5,198.

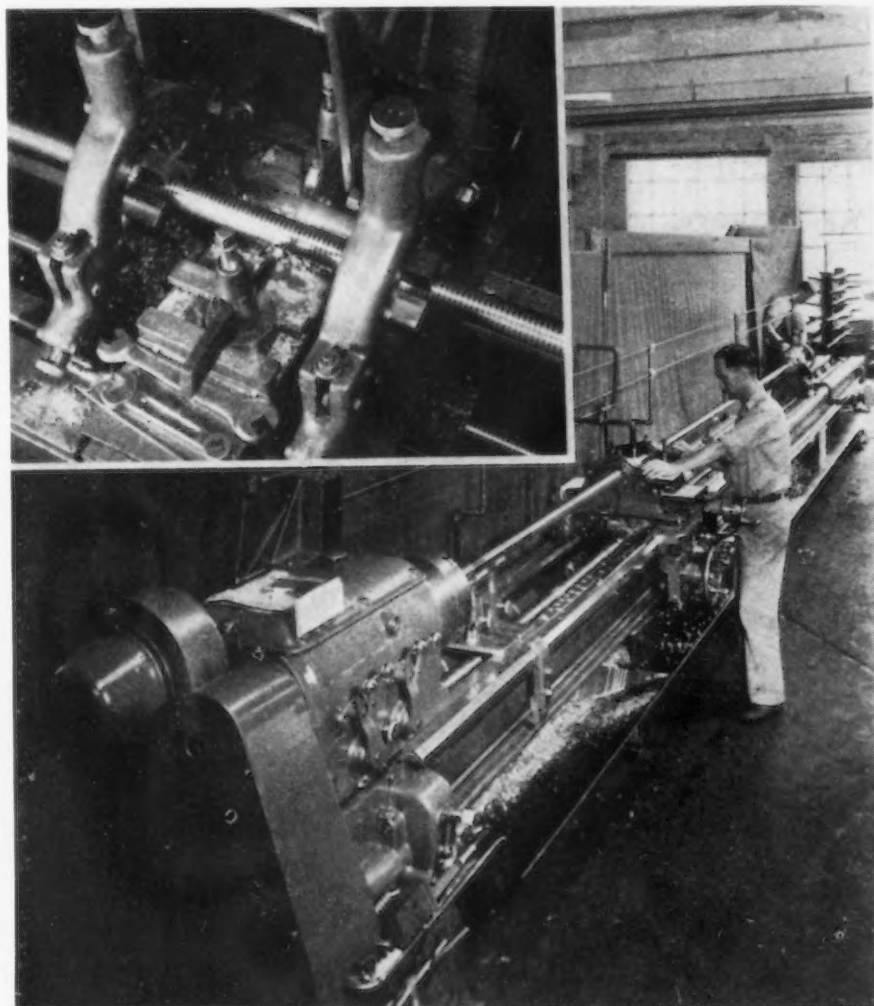
Crucible Steel Co. of America, New York; forgings, alloy steel, \$64,890.

Electric Products Co., Cleveland; set, motor-generator, \$9,050.

General Cable Corp., Washington, D. C.; cable, electric, \$56,749.

Grumman Aircraft Engineering Corp., Bethpage, N. Y.; wings (aircraft), \$30,888.

General Electric Co., Schenectady, N. Y.; cable, electric, \$66,551.



CHASING A 300 FT. THREAD. At Monarch Machine Tool Co., Sidney, Ohio, Acme threads on lathe lead screws up to 188½ in. long are now finish chased with but a single tool grind, and yet maximum error is being held to within 0.0005 in. per 12 in. of lead, speeding up production of lead screws in line with increased lathe production demands for industrial and defense needs. Finishing time required is reduced 50 per cent, the number of passes required also being reduced. Success of the operation in holding to close tolerances and fine finish is the use of Carboloy tools and the provision of rigid tool rests close to the tool and traveling with it. Material is X-1335 steel. Thread is 0.135 in. deep with 4 threads per in. About 0.010 in. stock per thread flank is left for the finishing operation.

Hanson-Van Winkle-Munning Co., Matawan, N. J.; set, motor-generator, \$6,916.

Hickok Electrical Instrument Co., Cleveland; indicators, aircraft, \$24,117.

Homelite Corp., Port Chester, N. Y.; generators, light weight, \$12,380.

Jones & Lamson Machine Co., Springfield, Vt.; lathes, turret, \$27,383.

R. K. LeBlond Machine Tool Co., Cincinnati; lathes, engine, \$16,105.

Lewis Engineering Co., Naugatuck, Conn.; leads and connectors, \$15,570.

Lionel Corp., New York, N. Y.; alidades, battle lookout, \$87,200.

Lloyd & Arms, Inc., Philadelphia; machine, horizontal honing and lapping, \$11,940.

Mattison Machine Works, Rockford, Ill.; grinder, surface, horizontal, \$27,377.

Metal Reduction Corp. of New Jersey, No. Bergen, N. J.; bronze, pig metal, \$28,782.

Monarch Mfg. Co., Milwaukee, Wis.; suits, flying, winter, \$391,190.

Midvale Co., Washington; forgings, alloy steel, \$26,775.

Monarch Machine Tool Co., Sidney, Ohio; lathes, engine, \$49,883.

National Electric Products Corp., Pittsburgh, Pa.; cable, electric, \$20,533.

National Supply Co., Toledo, Ohio; forgings, alloy steel, \$12,726.

Okonite Co., Passaic, N. J.; cable, electric, \$58,945.

Phelps Dodge Copper Products Corp., Habirshaw Cable & Wire Div., New York, N. Y.; cable, electric, \$22,957.

Henry Prentiss & Co., Inc., New York; lathe, turret, \$5,917.

Pratt & Whitney, Div. of Niles-Bement-Pond Co., West Hartford, Conn.; drills, radial, \$47,675.

Racine Tool & Machine Co., Racine, Wis.; hack saws, \$14,762.

Rasmussen Machine Co., Inc., Racine, Wis.; saws, hack, \$5,672.

Rockbestos Products Corp., New Haven, Conn.; cable, electric, \$18,402.

John A. Roebling's Sons Co., Trenton, N. J.; cable, electric, \$43,435.

William Sellers & Co., Inc., Philadelphia; machines, boring, drilling and milling, \$75,752.

Simplex Wire & Cable Co., Cambridge, Mass.; cable, electric, \$25,776.

Singer Sewing Machine Co., New York; machines, sewing, \$16,568.

Smith Booth Usher Co., Los Angeles, Cal.; grinder, universal, \$5,625.

Sperry Gyroscope Co., Inc., Brooklyn, N. Y.; equipment, gyro compass, \$265,833.

Steel Improvement & Forge Co., Cleveland; forgings, steel, \$46,806.

Submarine Signal Co., Boston, Mass.; fathometers, \$15,900.

David White Co., Milwaukee; sextants, \$136,534.

Corps of Engineers:

American Rolling Mill Co., Middletown, Ohio; steel, \$24,080.

American Steel & Wire Co. of N. J., Worcester, Mass.; wire, \$36,140.

Bausch & Lomb Optical Co., Rochester, N. Y.; mapping equipment, \$366,666.

J. C. Busch Co., Milwaukee, Wis.; multi-p'x tables, \$32,000.

Northwest Engineering Co., Chicago; diesel shovels, \$43,248.

Herman F. Ritz, Lancaster, Pa.; theodolites, \$22,200.

Vulcan Iron Works, Wilkes-Barre, Pa.; locomotives, \$14,985.

Whitcomb Locomotive Co., Rochelle, Ill.; locomotives, \$35,700.

Quartermaster Corps:

American Car & Foundry Co., Milton, Pa.; tank cars, \$679,640.

Ordinance Department:

Allegheny Forging Co., Pittsburgh; forgings, \$15,980.

H. F. Allen Co., Inc., New York; machines, \$1,060.

American Brass Co., Waterbury, Conn.; bronze, aluminum strips, \$10,957.

American Brass Co., Waterbury, Conn.; small arms ammunition, \$180,264.

American Manganese Bronze Co., Philadelphia; bronze, manganese, \$9,446.

American Cutter & Engineering Co., Detroit; tools, \$2,781.

American White Cross, Laboratories, Inc., New Rochelle, N. Y.; ammunition components, \$14,760.

Automatic Die & Products Co., Cleveland; machines, \$1,502.

Bodine Corp., Bridgeport, Conn.; machines, drilling, \$6,875.

Bridgeport Rolling Mills Co., Bridgeport, Conn.; brass, \$4,166.

Briggs & Stratton Co., Milwaukee; artillery ammunition components, \$847,000.

Borg-Warner Corp., Ingersoll Steel & Disc Div., Chicago; artillery ammunition components, \$7,614,630.

Candler-Hill Corp., Detroit; automotive equipment, \$3,937.

Chase Brass & Copper Co., Inc., Waterbury, Conn.; small arms ammunition, \$4,804.

Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, Ohio; machines, \$8,979.

Cleveland Container Co., Philadelphia; ammunition components, \$215,891.

Chase Brass & Copper Co., Inc., Waterbury, Conn.; brass, \$48,426.

Frederick Colman & Sons, Inc., Detroit; gages, \$1,385.

Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.; small arms material, \$1,014,869.

Cushman Motor Works, Lincoln, Neb.; ammunition components, \$582,600.

Continental Motors Corp., Detroit; automotive equipment, \$294,662.

S. Cowles & Co., New Haven, Conn.; small arms material, \$1,659.

Detroit Broach Co., Detroit; machinery, \$4,016.

Doehler Die Casting Co., Pottstown, Pa.; ammunition components, \$8,940.

E. I. du Pont de Nemours & Co., Carney's Point Works, Carney's Point, N. J.; ammunition components, \$233,000.

Charles Fischer Spring Co., Brooklyn; small arms material, \$55,929.

Foot-Burt Co., Cleveland; machines, \$23,710.

Lamson Corp., Syracuse, N. Y.; machinery, \$1,161.

Lees-Bradner Co., Cleveland; machines, \$11,730.

McIntosh Hemphill Co., Pittsburgh; class and steel castings, \$42,241.

Mack Molding Co., Inc., Wayne, N. J.; ammunition components, \$4,025.

Mercury Mfg. Co., Chicago; machinery, \$5,330.

Metal Goods Corp., St. Louis; copper tubing, \$16,937.

Mereen-Johnson Machine Co., Minneapolis, Minn.; machinery, \$3,433.

Ostrander Seymour Co., Chicago; machines, \$1,025.

N.L.C. Engineering & Equipment Co., Oswego, N. Y.; steam boilers and equipment, \$5,048.

Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn.; drills, \$2,700.

Pratt & Whitney Div., Niles-Bement-Pond Co., Hartford, Conn.; machines, \$2,642.

Precise Tool & Mfg. Co., Farmington, Mich.; gages, \$4,506.

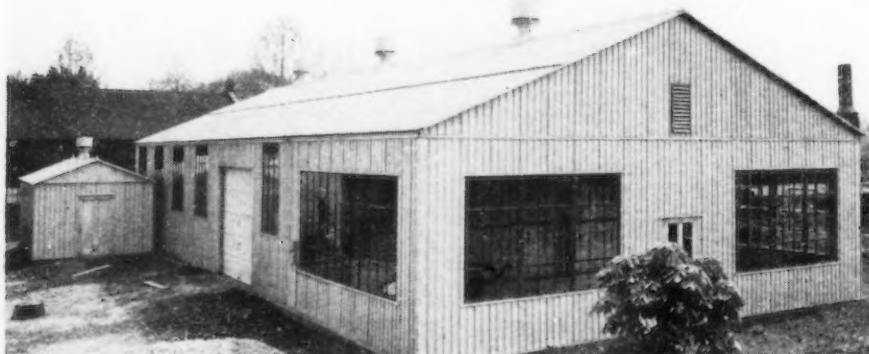
Putnam Tool Co., Detroit, Mich.; machinery, \$1,527.

B. M. Root Co., York, Pa.; machines, \$1,669.

Scovill Mfg. Co., Waterbury, Conn.; ammunition components, \$162,810.

W. E. Shipley Machinery, Philadelphia; machines, \$51,997.

Sperry Gyroscope Co., Inc., Brooklyn; fire control equipment, \$27,500.



BUILDING ERECTED IN 30 DAYS. This modern industrial steel building featuring a novel type of insulation, was completely erected within 30 days from the time McKenna Metals Co., Latrobe, Pa., placed the order with Blaw-Knox Co., Blawnox, Pa. Increased demand for metal cutting carbide tools, dies, and cutting materials, has caused McKenna Metals to place orders for two additional buildings of similar construction. This subject is more interesting in view of the speed required in putting up buildings to be utilized in national defense work such as manufacturing plants, cantonments, etc. The building is 40 ft. wide x 80 ft. long x 12 ft. high, 60 ft. of the length being occupied by a manufacturing section and the remainder being laboratory. Walls and ceiling of the laboratory are insulated and the manufacturing section is protected by an insulated roof. The insulating material is rigid board one in. cross section with an insulating value equivalent to brick 12 in. thick, and the board is covered and sealed in with galvanized steel sheets fabricated in standard panels to assure weather tightness and fire safety in the construction. The structural frame of the new building comprises standard rolled sections, the frame work being erected on a 12-in. deep concrete foundation and all structural connections were bolted, permitting disassembly or relocation if necessary.

Stewart-Warner Corp., Chicago; ammunition components, \$3,716.

Threadwell Tap & Die Co., Greenfield, Mass.; cutters, \$2,400.

Tools & Gages, Inc., Cleveland; gages, \$43,840.

J. C. Ulmer Co., Cleveland, Ohio; gages, \$3,375.

Union Gear & Machine Co., Boston; artillery material, \$1,537.

Waco Aircraft Co., Troy, Ohio; automotive equipment, \$2,750.

Waltham Watch Co., Waltham, Mass.; fire control equipment, \$62,152.

White Motor Co., Cleveland; automotive equipment, \$10,065.

Young Radiator Co., Racine, Wis.; automotive equipment, \$4,328.

Air Corps:

Aviation Mfg. Corp., Lycoming Division, Williamsport, Pa.; items-maintenance parts, \$63,950.

Barnard Aviation Equipment Co., Inc., Wilkes-Barre, Pa.; items of bolt and bracket, gun trunnion, \$75,264.

Bell Aircraft Corp., Buffalo, N. Y.; assemblies, \$249,375.

Bell & Howell Co., Chicago, Ill.; printer assemblies, \$130,095.

Electric Auto-Lite Co., LaCrosse, Wis.; gage assemblies and thermometer assemblies, \$193,482.

Fyr-Fyter Company, Dayton, Ohio; fire extinguishers, \$43,600.

General Electric Co., Schenectady, N. Y.; meters, \$11,235.

General Electric Co., Schenectady, N. Y.; maintenance parts, \$118,680.

Hayes Industries, Inc., Jackson, Mich.; assemblies, \$94,177.

Ingersoll-Rand Co., New York; hammers, \$50,877.

Walter Kidde & Co., Inc., New York; fire extinguishers, \$84,375.

Longines Wittnauer Watch Co., New York; clock assemblies, \$179,893.

P. R. Mallory & Co., Inc., Indianapolis, Ind.; control assemblies, \$342,650.

Manning, Maxwell & Moore, Inc., Bridgeport, Conn.; gage assemblies, \$459,185.

Standard Steel Works, North Kansas City, Mo.; trailers, dollies, spare parts, \$173,809.

Trailer Co. of America, Cincinnati; trailers, semi, dollies, \$188,052.

Weston Electrical Instrument Corp., Newark, N. J.; indicator assemblies, \$113,586.

Sheet & Tube Rebuilds Mill as Defense Step

Youngstown

••• Semi-finished steel production capacity at the Campbell plant of Youngstown Sheet & Tube Co. will be increased about 200,000 tons per year through changes at the billet mill. It is understood four light roughing stands will be replaced by six heavy stands, permitting use of larger billets. Three horizontal mills consisting of a 28-in. stand and two 24-in. stands will be installed, with three verticals, according to the plans. This major change will enable time saved on the blooming mill to be converted into slabs.

President Frank Purnell pointed out in a statement that the tonnage may be required in the present national emergency. He said:

"Improvements in processes, facilities and equipment have enabled Youngstown Sheet & Tube Co. to make larger tonnages at its open hearth furnaces so that there is a possibility of the blooming mills becoming a bottleneck in production.

"In order to relieve this situation, the company will rebuild its billet mill at its Campbell works to take a larger section from the blooming mill and thus increase the capacity of the blooming mill by 200,000 tons per year.

"When all factors are considered, this will have the effect of increasing the capacity of the company in the Youngstown district by the above amount. It is doubtful whether over the long pull this tonnage will be required from this district, but there are other important considerations and this tonnage may be required in the present emergency."

Lafayette Steel to Complete \$100,000 Program

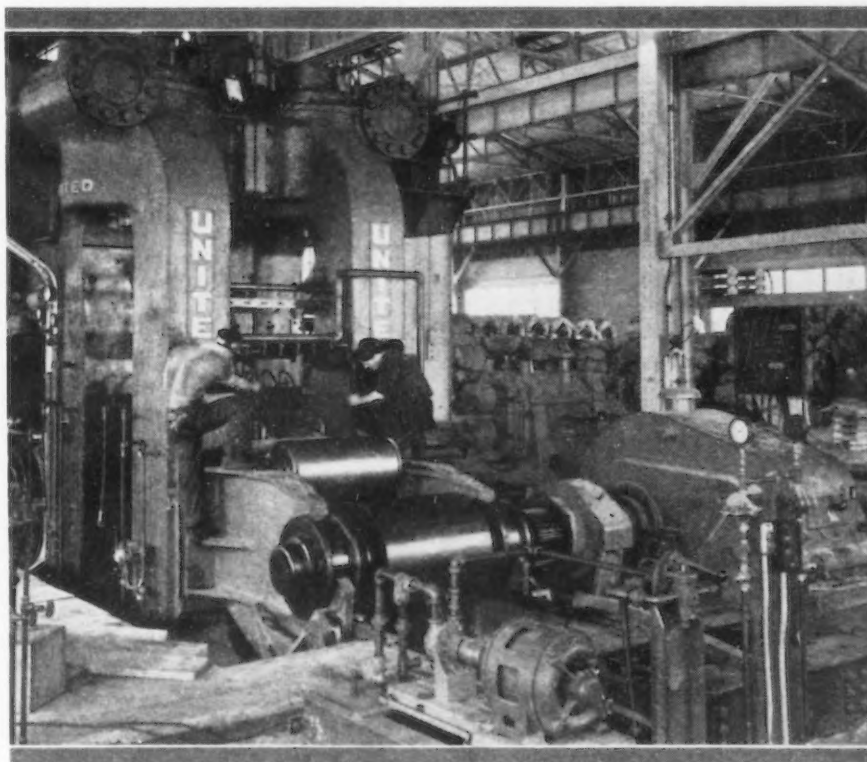
Chicago

••• Lafayette Steel Corp. will soon complete a \$100,000 expansion program, which includes a 40,000 sq. ft. one-story sheet steel warehouse. The firm, organized three years ago, is a jobber in tin mill and sheet mill products for prime and secondary grades.

Bendix Will Add 1500 More Employees

South Bend, Ind.

••• A 150,000 sq. ft. addition will be completed Jan. 1 for Bendix Products division of Bendix Aviation Corp. About 1500 new employees will be needed, bringing the total payroll to 8000. Actual operating schedules in the new plant have not been set because of the difficulty involved in getting and installing new equipment. Applications for employment will be deferred until the plant is ready for production. The firm is now producing aircraft carburetors, aircraft landing gear, pilot seats and aircraft hydraulic apparatus, and several new products for defense will be added when the addition is ready.



NEW FOLLANSBEE MILL—New equipment being installed in Follansbee Steel Corp.'s plant, pictured here, includes two 34-in. wide, single stand, 4-high temper mills, along with auxiliary shearing, cleaning, pickling and annealing equipment.

Certificates of Necessity Now Ready for Defense Work Firms

Washington

••• All companies engaged on defense work are required to have certificates of necessity. Where the companies put up their own money they must also have non-reimbursement certificates. In instances where the government provides funds for new or expanded emergency facilities it is necessary, in addition to certificates of necessity, to have certificates of Government protection.

These forms now have been prepared by the National Defense Advisory Commission, the War Department and the Navy Department and all constitute a part of administration of the five-year amortization act.

Under the terms of the emergency plant facilities certificate, in return for the manufacture and delivery of supplies, the government agrees to provide the contractor "with funds in reimbursement of expenditures to be made for the acquisition or construction by the contractor of emergency plant facilities," which are designated as constituting separate complete plants and one or more complete additions to an existing plant or plants. The contractor is required to furnish "the labor, materials, tools, machinery, equipment facilities, supplies and services . . . and all other things necessary for the acquisition or construction thereof."

The title to all emergency plant facilities shall be in the contractor but the latter shall allow no mortgage or other lien to be an encumbrance on the facilities nor transfer them unless given written consent of the head of the affected department.

The government agrees, "so far as it lawfully may," that it will at no time use the facilities for business or commercial purposes, provided that the government may at any time use such facilities for national defense or for any other purpose incident to an act of Congress.

The government further agrees that if it desires to sell or lease it will not do so without giving the contractor, "to the extent permit-

ted by law, a reasonable opportunity to purchase or lease the facilities . . . on the same terms and at the same price at which it is proposed to sell or lease them to any other party."

It is provided that "on the last day of each 60 consecutive calendar months beginning with such first calendar month 1/60th of the government reimbursement for plant costs so determined and the government shall pay such amounts to the contractor when and as the same become due."

A taxpayer who has been or will be reimbursed for all or part of the cost of any emergency facility is not allowed amortization deduction unless a certificate of government protection is also issued. A certificate of non-reimbursement with respect to any contract with the United States conclusively establishes that it does not provide for reimbursement to the applicant.

Deductions for income and excess profits tax purposes for amortization, over a 60-month period, with respect to any emergency facility, the construction of which was completed, or which was required after June 10, 1940, are provided in sections 23 and 24 of the Internal Revenue Code. Certificates are to be issued to the Commissioner of Internal Revenue by the Secretary of War or the Secretary of the Navy and the defense commission.

In the event that a taxpayer has no contract with the United States it is not considered necessary for the taxpayer, in addition to a "Necessity Certificate," to obtain a "Certificate of Government Protection" or a "Certificate of Non-Reimbursement," unless the taxpayer is the real party in interest under a contract with the United States, as, for example, a case in which some other person is acting in a contract as agent for the taxpayer to secure payment of the cost of the emergency facilities by the United States.

Section 124 of the Internal Revenue Code provides that the "Necessity Certificate" must be made before Feb. 5, 1941, or before the

beginning of the construction or the date of acquisition of the emergency facility, whichever is later, and that the "Certificate of Government Protection" and "Certificate of Non-Reimbursement" must be made before Feb. 6, 1941, or within 90 days after the execution of the contract, whichever is later.

In order that the applications may be acted upon and certificates made within the prescribed time, applications for such certificates should be filed at the earliest possible date. Unless filed in sufficient time, it will not be possible to act upon the applications within the statutory periods.

The term "Necessity Certificate" means certification that the construction or acquisition of facilities is necessary in the interest of national defense during the emergency period. The term "Certificate of Government Protection" means that the Government is adequately protected with reference to the future and disposition of emergency facilities. The term "Certificate of Non-Reimbursement" means that the reimbursement to the taxpayer is not provided for under a contract with the United States. The term "reimbursement" means reimbursement to the taxpayer either (1) directly by a provision dealing expressly with such reimbursement, or (2) indirectly, because the price paid by the United States, insofar as return of cost of the facility is used as a factor in the fixing of the price, is recognized as including a return of cost greater than the normal exhaustion, wear and tear.

Instruction regarding information to be given in application may be obtained from the Purchase and Contract Branch, Office of the Assistant Secretary of War, or from the Certification Unit, Office of the Judge Advocate General of the Navy, Washington.

63-Year Old Concern Passes To New Owners

Toledo, Ohio

••• The Donovan Wire & Iron Co., a 63-year-old Toledo industry, has been acquired from the founding family by Charles Fruchtman, active in two other metal companies here.

Single Defense Head Urged in Taft Bill

Washington

• • • Creation of a War Resources Administration is proposed by a bill introduced last Friday by Senator Taft, Republican of Ohio. The Ohio senator said that the purpose of the measure would be to co-ordinate all industrial and procurement phases of the defense program under a single administrator, and to follow the Industrial Mobilization Plan of 1939.

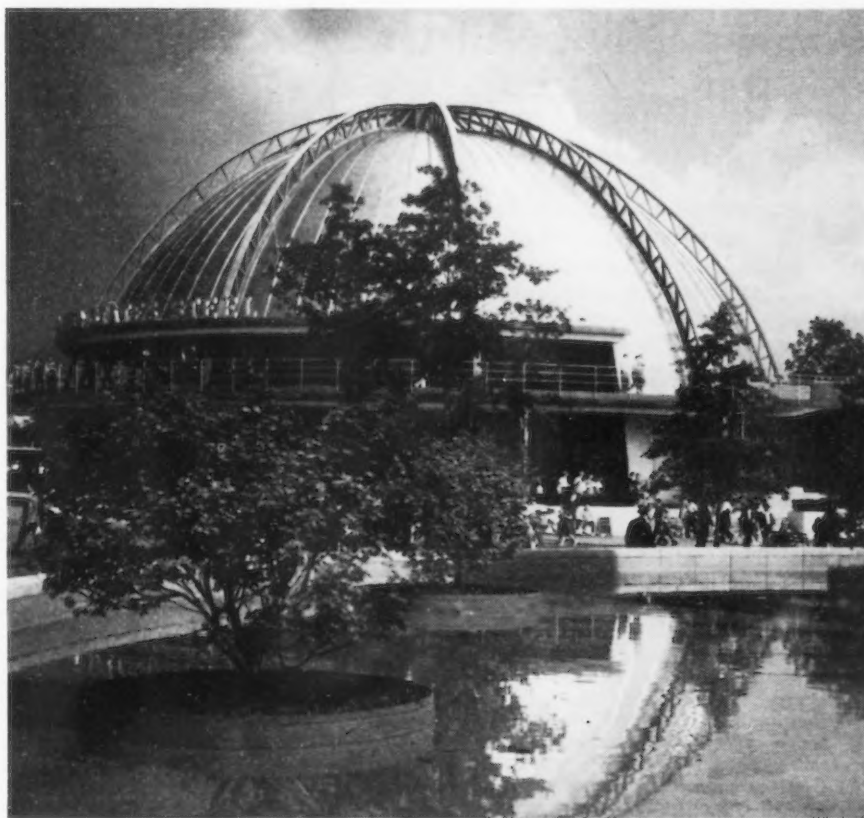
Pointing out that this plan has never been put into effect, Senator Taft said that it has been approved by the Army and Navy and that such patriotic groups as the American Legion are fully in accord with the principles which the experts have set as best calculated to gear in the full power of America's production and distribution system into the defense effort.

"We now have a National Defense Advisory Commission made up of seven able men without a chairman," said Senator Taft. "This body, however, is purely advisory and it is not perfectly clear whom the members are supposed to advise. Apparently each member reports to the President directly. So in effect we have seven new bureaus to coordinate existing bureaus and only the President has the power to coordinate the coordinators.

"While much good work and much progress have been possible under the present organization, the experience of past and present wars has proven the need for a separate War Resources group under the leadership of one man empowered to cut across red tape and give his undivided attention to the one vast problem of industrial teamwork for defense."

A coordinated defense plan, the senator stated, should be delegated to someone with industrial ability and background. The Industrial Mobilization Plan, he pointed out, was perfected under the past several administrations, is not a partisan issue and merits the support of both parties in Congress.

The War Resources group would be composed of an administrator and an advisory council appointed



THIS PHOTOGRAPH of the United States Steel Corp. exhibit building at the New York World's Fair has received first prize in a photographic contest. The winner was Miss Mary Bay of New York City. Hundreds of snapshots were entered in the contest.

by the President, the council to consist of the War and Navy Departments and other government bodies.

The administrator would be "directed (1) to formulate the basic policies for the mobilization of the economic and industrial resources of the country to meet the requirements of a major war; (2) after consultation with the Secretary of War and the Secretary of the Navy, to formulate detailed plans (a) for the acquisition, purchase, and storage of all raw, semi-processed, and finished materials and supplies necessary for the national defense, and (b) for the creation of adequate manufacturing capacity to manufacture arms, ammunition, implements of war, and other equipment and supplies in such quantities, and at such rates as may be necessary in time of war;

(3) "To make plans for the reduction of the activities of non-essential industries in time of war, or when war is imminent, and for their partial or total conversion

to more useful war purposes; (4) to coordinate the requirements submitted by the Army and the Navy for military equipment, munitions, and supplies, with the essential needs of other government agencies and those of the civilian population; (5) to make recommendations for legislation required to carry out the plans made; (6) to exercise all powers heretofore conferred on any official or department of the government to purchase, store, or carry strategic and critical materials; (7) to exercise all powers conferred on any official or department of the government to manufacture arms, ammunition, implements of war, and other equipment and supplies necessary for the national defense; (8) to exercise all powers conferred on any official or department of the government to construct government facilities at privately owned plants, or to lease government facilities to private manufacturers."

Defense contracts would require approval of the administrator.

Arming Will Swell U. S. Income to 102 Billions, Make 5.8 Million Jobs

—J. D. Biggers

Detroit

••• Within 18 months effects of \$12,500,000,000 of combined British and American orders for defense equipment will create in the United States an annual gross income of \$102,000,000,000 and will put at work 5,800,000 men and women, according to John D. Biggers, executive assistant to William S. Knudsen on the National Defense Advisory Commission. Mr. Biggers spoke to 800 members of the Engineering Society of De-

troit on Friday night in General Motors Auditorium.

Mr. Biggers, who once conducted for the President a survey of the nation's unemployed, added, "God knows, I wish it were any other kind of industry that would bring us that income." He is president of Libbey-Owens-Ford Glass Co., Toledo, O., and formerly was an executive with various automobile companies.

Twice in his address, Biggers referred pointedly to the "cumber-

some nature" and "unwieldy nature" of the "seven-person commission without a chairman." Sometimes all seven have an interest in the single problem of production, he said, and it becomes necessary to consult with all and win their goodwill and cooperation severally before action can be taken. Speaking of the "advisory commission" he said: "That word covers a multitude of sins; if you have ever tried to run a business with an advisory committee, you find both good and bad in it."

The privilege of altering this situation, he added, "rests in the executive office of the White House."

Pertinent to the mass-production industries' attempts to adapt peace-time facilities to defense work was the warning which Biggers said he carried from Knudsen: "He said to impress on you that his increasing experience in defense works upholds his belief that fine workmanship still counts; things cannot be skipped to make greater speed; lives are at stake." By inference, this warning could be applied to the Detroit undertaking of putting airplanes and aviation engines into production.

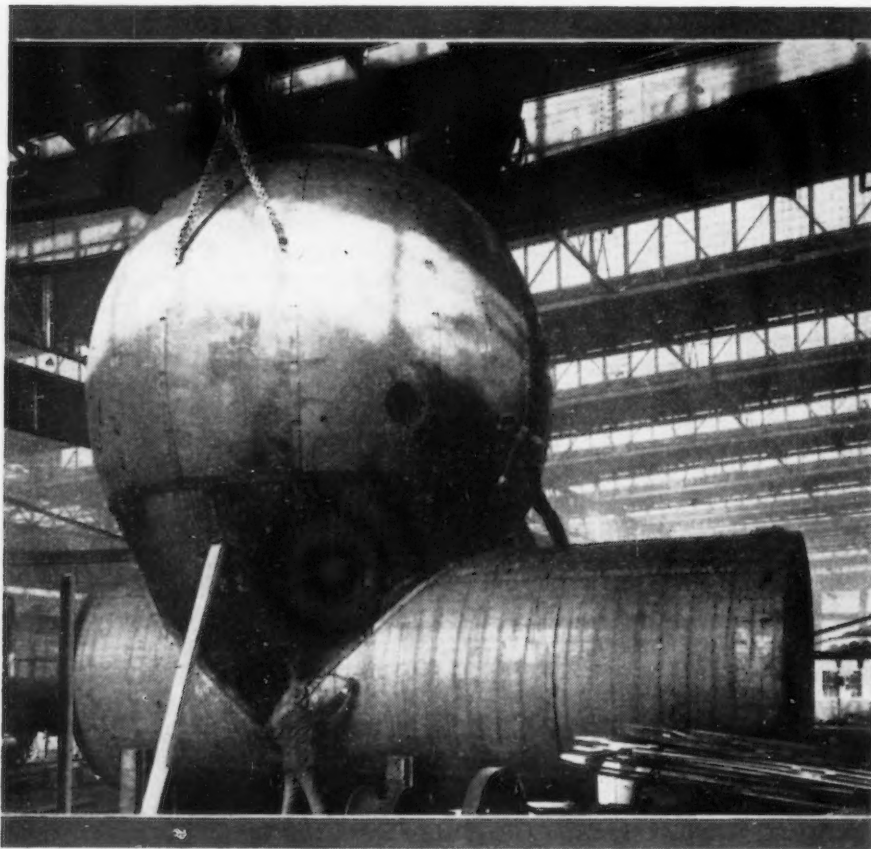
Sharp decentralization of defense industry is planned by the commission, Biggers revealed. He asked the engineering group to assist by listing all the available skilled men, machines and shops. Greater reliance is to be placed on the small plants, it was indicated, although Biggers said that so far it had been necessary to deal with "the proven firms, those which have had educational orders, and those which the Army and Navy have had previous contracts or experience."

While the initial concentration of defense business followed the two coastlines, the defense commission is now giving increasing thought to better distribution.

K. T. Keller, president of Chrysler Corp., introduced Biggers, and J. W. Parker, president of the Society, presided at the meeting. Keller emphasized the difficulties of turning the peace-time industries to the production of military goods. Taking the gears in an army tank as examples of manufacturing and tooling difficulties, he said that—for 90 per cent of the gears in the tank which Chrys-

THIS NOVEL APPEARING STRUCTURE illustrates how far designers are able to go in arc welded fabrications that involve complex assemblies of curved shapes. For the sphere, which is 21 ft. in diameter, 18 pieces are required, two dished pieces making up the crown section, 12 orange peel sections forming the main body and four pieces being needed to connect with the cylinder. The cylinder, 31½ ft. long and 10 ft. in diameter, is a single ring of four plates, but three are split at the intersection of the sphere and the cylinder, making seven pieces. The end is closed. The sphere and cylinder are knocked down for shipment and are welded in the field. All plate material is ¾ in. thick. At the site this so-called pump chamber and shaft is encased in solid concrete and the inside is given a 4-in. concrete liner. The structure was furnished by the Walsh Holyoke Steam Boiler Works, Inc., for the Metropolitan Water Supply Commission of Massachusetts for the Westboro, Mass., project.

Photo by courtesy of Wilson Welder & Metals, Inc.



ler will build—the auto plants do not even have usable gear-cutting machines; one gear requires 6½ hr. for the cutting of the teeth; another is so big that “you could ‘ring’ a gear-cutting machine with the gear, like a quoit around a stake.”

Comments offered by Col. J. G. Vincent, vice-president of Packard Motor Car Co., included the statement that the difference between building an aircraft engine and an automobile engine was so great as to defy comparison. “It takes more skill today to design a carburetor than it took to design the Liberty engine,” he declared. Army engineers do “know their business, well,” he stated, “if they did not, none of these engines could be put into production in less than five years.”

Echoing the plea from Biggers that the American people must not expect miracles in mass production, both Keller and Vincent spoke of the time element which is necessary to tool for special equipment needed for defense.

Prior to the general meeting, Biggers met for discussion, apparently on the defense program, with Keller, Vincent, Charles F. Kettering, General Motors vice-president; Alex Dow, chairman of the executive committee, Detroit Edison Co. and head of the Detroit Ordnance District; J. H. Marks, Packard vice-president in charge of the Rolls Royce engine program; George Romney, manager of the Automobile Manufacturers Association; Ira B. Swegels, vice-president, Hudson Motor Car Co.; Joseph Graham, president of Graham-Paige Motors Corp.; Lieut.-Col. Richard Z. Crane, of the Detroit Ordnance District, and Harvey Campbell, of the Detroit Board of Commerce.

78% More Get Jobs At Youngstown Office

Youngstown

• • • The placement record for the Youngstown office of the Ohio State Employment Service shows that during the first 10 months of this year 5785 persons have been placed, against 3087 for the first 10 months of last year, an increase of 78 per cent.

Machines Fight Wars Of Today, Berna Says

• • • Vital parts of airplane engines, tank motors and anti-aircraft guns, made on machine tools, must be accurate to less than one-tenth of the width of a human hair, Tell Berna, general manager of the National Machine Tool Builders' Association, told members of the Cleveland Engineering Society at a meeting of the society held Monday at the Hotel Allerton, Cleveland.

“The extent to which war has become mechanized,” Berna said,

Stainless Steel Trays For Army Mess Halls

Cleveland

• • • Stainless steel food trays are now being turned out in large quantity for the U. S. Army. Each tray is divided into six compartments, designed to eliminate the cumbersome dishes and trays formerly used by the Army, principally in mess halls. The trays are stamped from chrome nickel, 18-8 stainless steel cold rolled strip furnished by the Cuyahoga Works of American Steel & Wire Co.

“may be summed up in the statement that today it takes only 1500 men to throw as much metal on a target in a given time as 20,000 men could throw on that target during the last war. But these 1500 men must have from \$2,000,000 to \$2,500,000 worth of equipment, including equipment enabling them to move over 100 miles a day and communication equipment to keep in touch with headquarters—and they must have the mechanical skill and the engineering knowledge to operate this equipment.

“War today is fought by small groups of men who know how to operate machines. The machines do the actual fighting. And these machines are made largely by machine tools. Therefore we find the machine tool industry today constituting one of the first lines of national defense.

“The manufacturer of modern fighting equipment requires, first of all, amazing accuracy. Essential

parts of airplane engines, of tank motors, and of the recoil mechanism of anti-aircraft guns, for instance, must be accurate to within two ten-thousandths of an inch—less than one-tenth the thickness of a human hair. These parts are made on machine tools and therefore this accuracy must be built into machine tools. Without this accuracy, today's planes, guns, and tanks simply could not function. It might almost literally be said that today victory may be won by less than a hair's breadth.

“The next requirement is speed. We can't wait. We must re-arm this country just as rapidly as possible. Therefore machine tools must turn out work more rapidly than ever before.”

At the meeting, Myron S. Curtis, machine tool design consultant, described a single-purpose lathe for manufacture of shells, capable of turning a shell-a-minute, which was designed by the machine tool industry for the government.

Automotive Air Defense Committee Incorporates

Detroit

• • • Articles of incorporation for the Automotive Committee for Air Defense were filed Tuesday at the Michigan Secretary of State's office to give the organization status as a non-profit corporation.

The organization was created by the automotive industries on Oct. 25 at the request of Defense Commissioner William S. Knudsen to make automotive resources available for production of parts and sub-assemblies for the aircraft manufacturing industry. C. C. Carlton is director of the organization, which has offices at 8505 West Warren Avenue, Detroit.

Bethlehem To Erect New Pipe Warehouse

• • • Bethlehem Steel Co. has announced plans for a new pipe warehouse and increased finishing capacity to round out facilities at its new continuous-weld pipe mill at its Maryland plant, Sparrows Point, Md. The new warehouse, which will increase storage facilities 70 per cent, is to be completed by early summer.

Columbia Steel Moves Wire Rope, Fence Plant

San Francisco

• • • Columbia Steel Co., subsidiary of United States Steel Corp., will remove its wire rope and fence manufacturing plant from San Francisco to Pittsburg, Cal., where it will be consolidated with the company's mill. On the San Francisco site a steel warehouse with 250,000 sq. ft. of storage space will be erected.

The removal of the wire rope and fence plant was occasioned by the Navy's recent acquisition of Columbia's Risdon plant, in another part of San Francisco. This has been used recently only as a dock and for storage. To accommodate the steel formerly stored at Risdon and to keep San Francisco as the northern California distribution center, the new warehouse will be built. The wire rope and fence department will be housed at Pittsburg in a new 197,000 sq. ft. building.

Aluminum Industries To Build New Plant

Cincinnati

• • • Aluminum Industries, Inc., has announced purchase of property in Cincinnati for the purpose of constructing the first unit of a large plant in addition to its present four buildings in Cincinnati. The new unit will contain 150,000 sq. ft. of floor space and will be finished by March 1, 1941. The announcement was made by Harry J. Hader, general manager. The site acquired for this new construction, contains 27 acres and the first unit will be utilized for fabrication of aluminum and magnesium alloy castings for the aviation industry. Additional units are planned.

\$87,000 Welding Shop For Manitowoc Company

Manitowoc, Wis.

• • • New welding shop, at a cost of \$87,000, will be erected by the Manitowoc Shipbuilding Co. to be used in the construction of 10 submarines. Additions to the machine shop and office are included in the firm's expansion program.

10,000 Employees To Be Added at Plane Plant

St. Louis

• • • Construction of what is reported to be the mid-west's largest aircraft manufacturing plant was started late in November by the St. Louis Airplane division of the Curtiss-Wright Corp. To be erected at Lambert Field, the plant is scheduled for completion by next spring. Employees will be increased from the present 2000 to about 12,000. The corporation will establish its own training school in St. Louis to train part of the 10,000 employees who will be added. Preference is to be given to workers from the St. Louis area. Cargo transport planes will be produced at the new plant.

7500 Aluminum Workers Still Idle in CIO Strike

Pittsburgh

• • • Up to Tuesday of this week 7500 employees of the Aluminum Co. of America were idle at New Kensington, Pa., production on more than \$1,000,000 of national defense equipment was still halted, and approximately \$44,000 daily payroll was being lost as the CIO and the Aluminum company remains in a deadlock on the calling off of a 4-day old strike. The strike was called, according to union spokesmen, because the company refused to discharge or transfer a \$27 a week sheet mill helper who was accused of threatening a local union official with a knife when asked to pay \$12 delinquent dues.

Sheet & Tube Doubles Its Common Dividend

Youngstown

• • • Directors of Youngstown Sheet & Tube Co. have doubled the common dividend as the result of improved business conditions. A dividend of 50c. a share payable Dec. 16 to stock of record Nov. 30 was declared by directors Nov. 20. Payments for the previous three quarters this year were 25c. a share. The directors also declared regular preferred dividends of \$1.37½ a share payable Jan. 1 to stock of record Nov. 30.

Defense Work 20% of Entire WPA Program

Washington

• • • National Defense Advisory Commission has turned over several defense studies and statistical undertakings estimated to cost \$5,820,000 to a WPA white-collar project. One of the largest to be launched under the WPA defense program, the project will operate on a national basis and is expected to furnish employment for an average of 5563 persons over a 12-month period.

Defense work, according to the Works Project Administration, passed the \$100,000,000 mark during the week ended Nov. 16 and now accounts for approximately 20 per cent of the entire WPA program. Other projects approved during the first two weeks in November include \$3,020,336 worth of construction and improvement at Army posts in 21 states and the District of Columbia and projects totaling \$2,855,180 at civil airports.

New Kelsey-Hayes Plant To Make Machine Guns

Detroit

• • • Production of machine guns for Britain will be undertaken by Kelsey-Hayes Wheel Co., Detroit, as soon as the new plant has been completed near Plymouth, Mich. The plant will turn out both Colt and Browning models and funds for its construction and equipment are to be provided by the British government. No figures giving the size of the initial order have been released.

Grumman Aircraft Plans \$3,500,000 Plant Expansion

Washington

• • • Acquisition and installation of additional plant facilities to cost \$3,500,000 is contemplated in a War Department contract given the Grumman Aircraft Engineering Co., Bethpage, N. Y. Under the contract, the department said, the company will add 400,000 sq. ft. of productive floor space, the addition to be completely equipped for production, including machine tools.

NLRB Decree Held To Abridge Free Speech

Washington

••• Bethlehem Steel Co. last week asked the Supreme Court to review a decision by the Circuit Court of Appeals for the First Circuit which on Oct. 8 upheld the National Labor Relations Board's allegations of Wagner Act violations at the company's Fore River and Boston ship building plants in Massachusetts.

In its petition seeking review on a writ of certiorari, counsel for the company referred to the NLRB contention that an employer's statement on labor relations constitutes an unfair labor practice. The lower court decision, the brief asserted, abridges the right of free speech guaranteed by the constitution.

NLRB Recognizes AFL In Delco Department

Washington

The National Labor Relations Board has recognized the AFL as sole bargaining agent for production, maintenance and tool room employees in plants one and two of Delco Radio Division, General Motors Corp., Kokomo, Ind. The board also has called a collective bargaining election to permit production and maintenance employees at the St. Louis Airplane Division, Curtiss-Wright Corp., Robertson, Mo., to vote for the AFL's International Association of Machinists, for the Aircraft Independent Vertical Labor Union, or for neither.

Union May Get \$250,000 As Camp "Initiation Fees"

Rockford, Ill.

••• Prospects of a windfall of \$250,000 via the indirect aid of Uncle Sam face an AFL union here. From 4000 to 5000 men are to be employed on the \$4,250,000 building project at Camp Grant, which is to be completed by March 15. John Griffith & Sons, general contractors, are reported to have specified that all employees hold AFL membership cards, an action which is being fought by the CIO. The union is said to charge \$50 initiation fees, payable at the rate of \$2 down and the remainder within 60 days, plus dues of \$2 a month. Only 200 union members are employed at the camp now but the great bulk of the peak which may hit 5000 are still to be hired. Officials of the Rockford CIO industrial council have protested to Sidney Hillman of the National Defense Advisory Commission that their members are being denied employment at the camp. They contend their union does not charge an initiation fee and dues are only \$1.50 a month.

Goodyear to Expand Synthetic Rubber Output

Akron, Ohio

••• The Goodyear Tire & Rubber Co. plans to expand its production of a synthetic substitute for rubber. The company announced it would start immediately on construction of a new factory for this purpose near the Akron airport.

Cleveland Quarries Co. Merges Subsidiaries

Cleveland

••• Corporate action has been taken whereby the Cleveland Quarries Co. as of Nov. 30 will acquire the assets and assume the liabilities of two wholly owned subsidiaries, the Sterling Grinding Wheel Co. of Tiffin, Ohio, and the Ohio Cut Stone Co. of Cleveland, according to F. D. Kellogg, president of Cleveland Quarries. Commencing Dec. 1 the subsidiaries will be conducted as divisions. A. E. Tulk, formerly executive vice-president of Sterling Grinding, and Stanley D. Knight, executive vice-president of Ohio Cut Stone Co., have been made executive vice-presidents of the parent company in charge of the respective divisions.

H. A. Baker, President of American Can, Dies

••• Herbert A. Baker, who had been president of the American Can Co., New York, since 1936, died in the New York Hospital on Nov. 25, after a month's illness, aged 59 years. After receiving his bachelor of arts degree from the University of Toronto in 1906, he joined the Chemical Reduction Co. of Niagara Falls, N. Y., as a chemist. In 1908 he joined the American Can Co., with which he was associated for the remainder of his career, first as a chemist, and then successively as sales manager of the central district and as vice-president in charge of sales, before being made president in 1936.

DEMAND FORCES OVERTIME WORK IN AUTOMOBILE PLANTS

Detroit

••• A 20 per cent boost in production to meet retail buying demands has been ordered by Nicholas Dreystadt, general manager of Cadillac Motor Car Division of General Motors Corp.

"Starting this week, hours and employment were increased to provide a manufacturing schedule of 300 cars a day," said Mr. Dreystadt. "This means some departments will be operating on a 9-hr.

day, others on 8½ hr. and still others on a 5½-day week."

Pressure of retail demands for automobiles has forced a group of automobile plants to work extra days to make up for holidays, etc. Compensating for the Thanksgiving holiday, Chevrolet at Flint operated two 9-hr. shifts on Saturday in all but the final assembly line. Chevrolet has been working two 9-hr. shifts daily since the beginning of the month.

A portion of the AC Spark Plug and Buick plants also operated last Saturday, although the Buick final assembly line did not operate. Fisher body plant No. 1, which supplies bodies to Buick, is working 9 hr. each day on two shifts except in the stamping department. Buick's final assembly line and other departments in the Buick plant have been working an hour overtime on each shift for several weeks.

Possibility of Steel Wage, Checkoff Discussions Reported at Pittsburgh

By T. C. CAMPBELL

Pittsburgh

••• Reports persist in steel and union circles that some sort of an approach will be made soon towards reopening contracts between the SWOC and some major steel companies.

Initial moves will probably be on an informal basis in order to escape invoking the legal machinery as set up in the contracts. The latter calls for a formal notification in case a change is desired in the contract and if no agreement is reached within 20 days of the date of notification the contract would become void. Obviously the informal conference will be utilized to its fullest extent.

Although the wage question is uppermost in the minds of both union and steel officials, it will for the time being at least probably be kept in the background while the more important question, to the SWOC at least, of some form of dues checkoff, will receive the most attention.

Quite a few of the outlaw strikes and dues picketing disturbances in the Pittsburgh industrial area during the past year have centered on the attempt by the SWOC to increase dues collections.

The wage question will undoubtedly come to the forefront in the not far distant future and there is no doubt that the steel industry at that time will be pretty much "in the middle." By conferences, veiled threats, etc., the steel industry has been warned not to raise its prices and the question of how to meet increased wage rates with no additional compensation in the form of higher steel prices has been left unanswered by the administration and others. It is axiomatic that once wage rates are advanced, they usually stick for an extended length of time but this cannot be said of steel price increases.

What the outcome of these quiet behind the scenes moves will be remains to be seen but the



NEW CHAIRMAN of the CIO, succeeding John L. Lewis, is Philip Murray (above), head of the Steel Workers Organizing Committee. Mr. Murray, once a coal miner, replaced Lewis when the former CIO chairman kept his promise to resign that post if Roosevelt were elected President. Lewis, however, remains as president of the United Mine Workers, strongest of the CIO unions.

issues mentioned above may soon have to be met by both sides. While the more popular approach might probably involve the wage question, it is likely that this will be used as a bargaining factor in an attempt to obtain a checkoff.

The SWOC, it is understood, has already explored with some success the method of obtaining authorized signatures from their members allowing a deduction of dues in case this point could be settled with steel companies. The election of Philip Murray as CIO head assured concentration on "organizational" activities of which dues collections are a part since Mr. Murray has repeatedly

stated that he is primarily interested in organization work. It is more than likely that steel companies, should they be approached on the wage question, will have already fairly clear in their own minds just what their counter proposals will be.

Wages Advanced 5% By Reeves Steel & Mfg. Co.

Dover, Ohio

••• Officials of the Reeves Steel & Mfg. Co. here have announced a voluntary increase of 5c. per hour in the base wage rate of all hourly, piecework and tonnage workers. Adjustments benefiting all other works also will be made, it was said.

Remington Receives \$73,575,261 Contract

Washington

••• The War Department has awarded a \$73,575,261 contract to the Remington Arms Co., Inc., Bridgeport, Conn., for procurement of equipment and for operation of an ammunition plant near Lake City, Mo., about 12 miles east of Kansas City. Negotiations for the construction of the plant have not yet been completed. The title to the plant and equipment will remain with the government.

C-I to Make Light Armor Plate at Farrell

Farrel, Pa.

••• Carnegie-Illinois Steel Corp. will convert its idle tin mill here into an armament plant to fabricate light armor plate for tanks. Cost of modernizing the tin mill, idle since last February, is estimated at several million dollars and employment will be given to about 500 men when operations start.

Mississippi Valley Iron Co. Bankrupt

••• A receiver has been appointed for the Mississippi Valley Iron Co., St. Louis, one of the enterprises of the late Edward F. Goltra. Its plant, which had not been operated since 1926, is assigned a scrap value of \$100,000.

Republic Votes 40c.

For Common Stock

• • • Republic Steel Corp. this week declared a 40c. dividend on common stock, the first since 1930, increasing the company's dividend disbursements on all classes of stock for 1940 to \$6,897,375. This total does not include the \$6,300,000 purchase fund for 6 per cent cumulative convertible preferred stock set aside recently by the board of directors.

Tom M. Girdler, Republic chairman, reported the company's earnings for the first nine months of 1940 totaled \$12,633,000, that operations are above 95 per cent of capacity and that the fourth quarter is expected to be the best of the year. Prospects for 1941 appear favorable, the Republic executive said.

The common dividend will be payable Dec. 27 to stock of record Dec. 10.

Republic directors meeting at New York authorized building of another 50-ton electric furnace at Canton, Ohio, the fourth such unit completed or planned by this company this year.

"The nation's steel capacity is ample to meet defense needs," Mr. Girdler said. "Industry cannot be swayed by every new theory anyone gets. I don't think they have anything to worry about." Myron C. Wick, Republic vice-president, said it is a question as to whether inventories of steel have increased since Oct. 1. Exports plus domestic deliveries have about equaled output for the last 60 days, Mr. Wick said.

Rise in No. 10 Can Prices Held Unjustifiable

Washington

• • • Claiming that evidence indicates that there is a speculative interest in 10 size cans, in which military foods are usually purchased, the Quartermaster General has issued an order authorizing purchase of canned foods in No. 2 and 2½ (small) size cans as an alternate to No. 10. It was declared that the so-called speculative interest in the large size has led to unjustifiable increases in prices. The Quartermaster General issued the order after consul-

tation with the National Defense Advisory Commission.

The commission said that should the alleged speculative condition respecting the large size can continue not only the Army but institutional buyers of food in large size cans, such as hospitals, schools, restaurants, etc., would face unjustifiable increases in cost of canned goods. The quartermaster's order, it was pointed out, should have a tendency to bring about more nearly normal relationships between the prices for the different sizes.

Cleveland Is Site Of New Plane Engine Lab

Washington

• • • Cleveland Municipal Airport has been selected as the site for the new \$8,400,000 government engine research laboratory which is expected to be in operation within a year. Approximately 100 experts will be moved from the National Advisory Aeronautics Committee's present laboratory at Langley Field, Va., to Cleveland, as soon as equipment becomes available.

JOHN EDGAR HOOVER
DIRECTOR

Federal Bureau of Investigation
United States Department of Justice
Washington, D. C.

October 31, 1940

Associated Business Papers, Inc.
369 Lexington Avenue
New York, New York

Gentlemen:

In the war-torn world of today America must strengthen her internal and external fortifications if she is to survive the menace of totalitarianism. The protection of our industrial facilities to insure the uninterrupted production of goods and material is essential to our national defense. Based upon this premise the FBI in September of 1939, in accordance with the request of the War and Navy Departments, inaugurated a program to survey the protective facilities of manufacturing establishments having large contracts to provide the government with defense materials. The purpose of the surveys is to submit recommendations to bolster the physical protective facilities of the manufacturing plants for the prevention of sabotage and espionage activities.

The first and final responsibility to give speed and strength to our national defense program by protection against espionage and sabotage lies with industry itself. Only through the energy and alertness of its officials and workers will the full measure of preparedness be attained.

In line with this plant survey program and to assist industrial concerns and municipalities in establishing effective protection against possibilities of acts of espionage and sabotage the FBI prepared a comprehensive booklet entitled "Suggestions for Protection of Industrial Facilities." Because of its confidential nature this booklet is limited in distribution to heads of duly constituted law enforcement agencies and executive officials of industrial concerns manufacturing defense materials under government contracts.

In response to the many questions as to how to obtain this publication I wish to state that a copy will be furnished an industrial concern upon the written request of an executive official.

Sincerely yours,

J. Edgar Hoover
John Edgar Hoover
Director

J. EDGAR HOOVER, director of the Federal Bureau of Investigation, offers heads of industries making defense material a booklet on "Suggestions for Protection of Industrial Facilities." His letter, reproduced above, is self-explanatory.

- **Bill Rogers**, since 1933 general factory manager of the Caterpillar Tractor Co., Peoria, Ill., has retired, effective Dec. 1. The post will be discontinued, the three factory managers under Mr. Rogers to report to **T. J. Connor**, vice-president in charge of manufacturing. Mr. Rogers has been with the company for 20 years, having joined the San Leandro works as machine shop foreman.

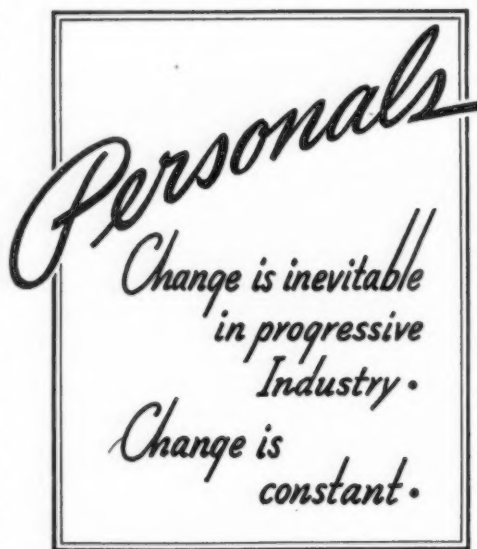
- **W. C. Doemel**, formerly manager of the Webster Mfg. Co., Inc., Tiffin, Ohio, and who has had more than 25 years of experience in the foundry industry, has been appointed superintendent of the Vulcan Mold & Iron Co., Latrobe, Pa. He will be in complete charge of manufacturing operations effective Jan. 1. **R. T. Dunlap**, who up until a few months ago was superintendent of the company and is now plant manager, is resigning Jan. 1 to become works manager of the Vulcan Iron Works, Wilkes-Barre, Pa.

- **G. L. McMullen**, vice-president of the Gisholt Machine Co., Madison, Wis., and formerly associated with the Caterpillar Tractor Co., Peoria, Ill., has accepted an executive sales position with the Buda Co., Harvey, Ill.

- **M. J. Sullivan**, formerly vice-president in charge of the Pacific Coast district of the American Can Co., New York, has been made ex-



M. J. SULLIVAN, executive vice-president of American Can Co.



ecutive vice-president. He will make his headquarters at the general offices of the company at 230 Park Avenue.

- **C. J. Smith** has been promoted to assistant to the general superintendent of Gary works of Carnegie-Illinois Steel Corp. He will be in charge of engineering and maintenance. Simultaneously, the firm announced changes involving 17 other supervisory positions. Succeeding Smith as division superintendent of maintenance is **T. R. Miller**. **W. S. McNabb** becomes assistant to the general superintendent as coordinator of standard costs and budgetary control. **Donald Petersen** is promoted to the new title of superintendent of transportation. **P. J. Hake** and **Frank Roberson** are now assistant division superintendents of maintenance and construction respectively. Other promotions: **D. M. Kiniburgh**, assistant to division superintendent, maintenance industrial engineering; **Eric Svedelius**, technological coordinator; **George Tree**, assistant to the division superintendent, west mills, in charge of maintenance; **O. Clarke**, central mills, in charge of maintenance; **William Tohle**, assistant to division superintendent of steel production, in charge of maintenance; **R. D. Wearne**, assistant to division superintendent, coke plant and blast furnaces, in charge of maintenance; **E. A. Comstock**, assistant to division superintendent, fuel and power, in charge of maintenance; **J. G. Sponsel**, superintendent of plant maintenance shops; **H. A. Pfaff**, assistant to Sponsel; **H. A. V. Lundstrom**, foreman of electric shop; **William**

Riddle, Jr., general foreman of foundry and pattern shops.

- **A. W. Gardes** has been named factory manager in charge of production of Eureka Vacuum Cleaner Co., Detroit. Mr. Gardes has been employed by the National Cash Register Co. for 16 years, having started as product designer and advancing through the tool design department which he eventually headed.

- **Walter S. Gaines**, formerly associated with Cleveland Tractor Co., National Carbon Co., and Glascote Co., has been appointed plant manager of Porcelain Steels, Inc., Cleveland producers of porcelain enameled tanks and roofing and siding.

- **John Dykstra** has been named assistant works manager of Olds Motor Works and **Roy A. Fishel** has been named night superintendent. Mr. Dykstra formerly was general superintendent of Oldsmobile production and Mr. Fishel was superintendent of the six and eight cylinder motor plants. Mr. Dykstra served his apprenticeship as a die maker with the Brisco Mfg. Co., Detroit, and in World War I was in the Motor Transport Corps. Following the war he was with Cadillac and Hudson. He was superintendent of the sheet metal division of Olds from 1934 through 1939. Mr. Fishel started as a tool maker in 1910 at Reo and re-



JOHN DYKSTRA, assistant works manager of Olds Motor Works.

mained with that company until 1918, when he joined Olds.

- **Norbert K. Koebel**, for the past 4½ years metallurgist for the Eastman Kodak Co., Rochester, N. Y., has been appointed research director for the Lindberg Engineering Co., Chicago. Previously he was at Battelle Memorial Institute, where he conducted research on furnace atmospheres. Mr. Koebel is author of the article in this issue on "Industrial Controlled Atmospheres."

Ralph W. Stahl, heretofore service engineer for Lindberg in the Chicago territory, has been made manager of the newly-opened office at Indianapolis, to serve Indiana, Kentucky, Tennessee and the southern Ohio area.

- **Henry E. Hund**, formerly vice-president and general manager of Briggs Mfg. Co. and prior to that an officer of the Murray Corp. of America, has been named by the board of directors of Reo Motors, Inc., Lansing, as president and general manager. He succeeds Col. Fred Glover, who resigned several months ago.

- **Bernard M. Bickford**, formerly assistant general superintendent of the Plymouth main plant in Detroit, has been named manager of the Evansville branch plant of Plymouth division, Chrysler Corp. Mr. Bickford has been an automobile production man since he was graduated from high school in Saginaw, Mich. Starting as a tool room apprentice, he spent 15 years in production work before joining Plymouth in 1931.

- **James Work** has been elected chairman of the board of Brewster Aeronautical Corp., Newark. **George F. Chapline** has been made president and general manager, **Dayton T. Brown**, vice-president in charge of experimental research and development, and **William L. Smith**, vice-president in charge of materiel. Mr. Work as chairman of the board will remain active in the affairs of the company as chief executive officer.

Mr. Chapline, who has been vice-president in charge of sales of Wright Aeronautical Corp. since 1935, was graduated from the United States Naval Academy in 1916. After active service in the Navy, he was assigned to the Massachusetts Institute of Technology for post-graduate work in



LEONID A. UMANSKY (above), whose appointment to the post of assistant manager of the industrial engineering department of General Electric Co., was announced in these columns last week.

FRANCIS MOHLER (below), engineer of the steel mill section.



aeronautical engineering, which he completed in 1925. He then returned to Annapolis to organize an aviation ground school course. In 1928 he was transferred to Washington, where he was assigned to the planning division of the Bureau of Aeronautics. He resigned the following year to become service manager of the Wright Aeronautical Corp. In 1930 he became assistant director of sales and service, in 1933 sales

manager, and two years later vice-president in charge of sales.

Mr. Smith, who became associated with Wright Aeronautical last month, was until August director of air purchases for the British Purchasing Commission, a post assumed in December, 1939, when Western Electric Co. granted him a leave of absence as contract engineer. He had been associated with that company since his graduation from high school in 1916.

- **J. F. Wolfram** and **Maurice A. Thorne** have been named assistant chief engineers of Oldsmobile division of General Motors and **John Oswald** has been named director of styling. Mr. Wolfram, formerly experimental engineer, will be in charge of the engine transmission and axle development division. He has been associated with Oldsmobile for 12 years. Mr. Thorne, formerly chassis engineer, will be assistant chief engineer in charge of the body, chassis, electrical and accessory groups and office administration. Mr. Oswald, who has been body engineer for Oldsmobile since 1929, during that time has contributed much to Oldsmobile styling and appearance.

- **David S. Lewis** has been appointed assistant to **T. W. Pennington**, sales manager, by Jessop Steel Co., Washington, Pa. Mr. Lewis joined the sales department of Jessop Steel Co. in 1928.

- **R. N. Miers** has been appointed Eastern district engineer of Allis-Chalmers Mfg. Co.'s steam turbine division. For the past six years, Mr. Miers has worked on steam turbine sales and general engineering matters. His new headquarters will be in Boston.

- **John F. Ditzell** has been appointed general sales manager of Shafer Bearing Corp., Chicago, manufacturer of self-aligning roller bearings and power transmission bearing equipment. Mr. Ditzell was for a number of years a sales executive of the Stewart-Warner-Alemite Corp.

- **E. A. Brown, Jr.**, has been made superintendent of the power and fuel division at Gary works and **F. L. Collins** as assistant superintendent of this division of Carnegie-Illinois Steel Corp.

Mr. Brown, who has been in the

industrial engineering field for the past 30 years, was superintendent of the fuel division at the time of his appointment. Mr. Collins was superintendent of power production in the maintenance division and has been associated with the Gary plant since 1909.

- **R. A. Karr**, formerly identified with the Battelle Memorial Institute and later with the Central Al-



P. W. BROWN, assistant works manager of Wright Aeronautical Corp., whose appointment was announced in these columns last week.

loy division of Republic Steel Corp., has been appointed metallurgist for Copperweld Steel Co., Warren, Ohio.

- **W. P. Knecht** has been appointed district sales manager at Worcester, Mass., for Universal-Cyclops Steel Corp., succeeding **W. J. Long**, who has been transferred to the executive offices of the company at Bridgeville, Pa.

- **Lee F. Frampton** has been made representative for the sale of tool and drill steels in the Blue Ridge and Ohio Valley territory for A. Milne & Co. He will make his headquarters in Parkersburg, W. Va.

- **William H. Winton** has been made superintendent of blast furnace and coke ovens in the Gulf-steel district for Republic Steel Corp., Gadsden, Ala. Mr. Winton

was born at Greenville, Ala., and is a graduate of Alabama Polytechnic Institute. He started as a chemist in the Gadsden plant of Gulf States Steel Co. in 1921, advancing to the position of assistant chief chemist and in 1937 to chief chemist. He was named last year as assistant superintendent of blast furnace and coke ovens of the Gulfsteel district.

- **William F. Wise**, president of Republic Products Corp., Detroit, has been named executive vice-president of Aviation Mfg. Corp., Williamsport, Pa. Mr. Wise will supervise the Aviation Corporation's Lycoming and Spencer Heater divisions at Williamsport, and will continue as head of Republic.

- **H. T. Lintott** has been appointed manager of industrial relations by Columbia Steel Co. subsidiary of United States Steel Corp. He succeeds **E. M. Stephens**, who since 1939, has been on temporary assignment in the post from United States Steel Corp. of Delaware, Pittsburgh. The appointment will be effective Dec. 1.

Mr. Lintott, who until his present appointment, served as general superintendent of Columbia's Torrance, Cal., plant, will be transferred to the company's general office in San Francisco. He will be succeeded by **Otto A. Kresse** as general superintendent of the Torrance plant. Mr. Kresse was formerly assistant general superintendent.

Besides serving as general superintendent, Mr. Lintott has been active in civic affairs of Torrance. He is a native of Visalia, Cal., and attended the University of Nevada. In 1928 he joined Columbia Steel Co. as chief electrician of the Torrance plant. In 1929 he was advanced to assistant general superintendent and in 1939 was appointed general superintendent, which position he has held until his present appointment.

Mr. Kresse began his career in 1903 as an open hearth helper in the Dutcher Steel Co., Milwaukee. He joined Columbia Steel in 1910 as open hearth melter foreman. In 1923 he became open hearth superintendent of Columbia's Pittsburg, Cal., plant and in 1928 was transferred to the company's Torrance plant. He was advanced to assistant general superintendent of the plant in 1939.

Obituary

- **Eugene W. Pargny**, former president, American Sheet & Tin Plate Co., Pittsburgh, died in New York, Nov. 9, aged 74 years. Mr. Pargny began his career in the steel world in 1890 as purchasing agent for the Apollo Iron & Steel Co., later becoming its manager. From 1901 to 1904 he was manager in charge of all the plants in the Pittsburgh district of the American Sheet Steel Co. In 1904 he became vice-president of the American Sheet & Tin Plate Co. and from 1909 to 1932, when he retired, he had been its president.

- **John W. Kershaw**, Plymouth, Mich., retired foundry superintendent of the Michigan Alkali Corp., died Nov. 11, aged 75 years. He had been identified with Michigan Alkali for 18 years, retiring in 1936.

- **Frank M. Raymond**, vice-president of the Raymond Mfg. Co., died Nov. 7, aged 59 years. Mr. Raymond was born in Corry, Pa., where he spent his entire life with the exception of a few years when he was Pacific Coast representative of the Climax Mfg. Co. Besides being vice-president of the Raymond Mfg. Co., he also was vice-president of the Associated Springs Corp., and has been identified with other subsidiaries of the corporation.

- **Robert Kendrick Palmer**, former chief engineer and vice-president in charge of operations of the Hamilton Bridge Co., Hamilton, Ont., died Nov. 17, after a short illness. He was born in Geneva, N. Y., and was graduated in engineering from the University of Michigan in 1894.

- **Frank Icke**, retired last February as vice-president and secretary with the dissolution of Fritzke & Icke, Inc., prominent Milwaukee machinery firm, died Nov. 15 at Two Rivers, Wis., from a heart attack while on his way to Milwaukee from his summer home at Sturgeon Bay, Wis. He was a native of Milwaukee and had held responsible positions with several Milwaukee firms before organizing the company with which he was associated as a partner.

Metal Working Activity

. . . Latest Data Assembled by The Iron Age

From Recognized Sources. In Net Tons.

	Sept. 1940	August 1940	Sept. 1939	9 Months 1940	9 Months 1939
Steel Ingots:					
Monthly output ^a	5,895,232	6,033,037	4,769,468	46,201,463	33,535,012
Average weekly output ^a	1,377,391	1,361,859	1,114,362	1,180,416	859,872
Per cent of capacity ^a	90.75	89.72	72.87	77.77	56.23
Pig Iron:					
Monthly output ^b	4,176,527	4,238,041	3,223,983	33,552,113	22,867,049
Raw Materials:					
Coke output ^c	4,899,201	4,959,973	3,979,521	41,048,570	29,698,351
Lake ore consumed ^d	6,352,548	6,384,832	4,184,884	49,536,393	28,074,239
Scrap iron consumed ^e	4,341,120	4,444,160	3,380,160	33,131,660	23,682,480
Castings:					
Malleable, orders ^f	53,079	52,994	64,732	369,523	327,891
Steel, orders ^f	83,945	71,734	96,687	494,320	398,474
Finished steel:					
Trackwork shipments ^a	5,496	6,480	4,916	61,150	49,597
Fabricated shape orders ^f	221,991	109,918	118,020	1,143,314	988,575
Fabricated plate orders ^g			39,751		269,980
U. S. Steel Corp. shipments ^h	1,392,838	1,455,604	1,086,683	10,433,727	7,556,087
Fabricated Products:					
Automobile production ^b	269,108	75,873	188,757	3,005,212	2,459,973
Steel furniture shipments ^a	2,391,691	2,339,441	2,006,508	20,202,717	16,070,563
Steel boiler orders ^g (sq. ft.)	3,726,433	1,274,940	1,752,243	12,240,422	8,653,259
Locomotives ordered ⁱ	57	65	52	358	213
Freight cars ordered ⁱ	9,470	7,645	24,231	33,486	33,623
Machine tool index ^j	94.9	93.3	74.6	92.7†	63.4
Foundry equipment index ^k	161.2	165.4	*	158.7†	*
Gear sales index ^l	183	191	126	139.8†	95.9
Non-Ferrous Metals: (U. S. only)					
Lead shipments ^l	53,456	51,643	59,889	426,382	379,768
Lead stocks ^l	41,292	43,321	97,473		
Zinc shipments ^m	66,824	64,065	69,424	502,278	407,770
Zinc stocks ^m	30,965	44,670	95,615		
Tin deliveries ⁿ	12,779	13,966	5,656	91,632	52,214
Refined copper deliveries ^o	96,485	96,383	*	682,961	*
Refined copper stocks ^o	185,313	198,730	*		*
Exports:					
Total iron and steel ^p	1,221,052	1,402,075	575,613	7,909,784	4,278,582
All rolled and finished steel ^p	402,997	495,263	167,674	2,988,312	1,234,176
Semi-finished steel ^p	462,732	411,619	36,319	1,960,092	139,888
Scrap ^p	255,608	355,991	330,680	2,419,833	2,761,594
Imports:					
Total iron and steel ^p	2,598	2,105	29,874	48,293	266,047
Pig iron ^p	1,830	882	4,176	9,554	29,423
All rolled and finished steel ^p	451	769	8,342	12,336	144,670

Data in italics are eight months' totals.

Source of data: ^a American Iron and Steel Institute; ^b THE IRON AGE; ^c Bureau of Mines; ^d Lake Superior Iron Ore Association; ^e Bureau of the Census; ^f American Institute of Steel Construction; ^g United States Steel Corp.; ^h Preliminary estimates by THE IRON AGE—Final figures from Bureau of the Census, U. S. only; ⁱ Railway Age; ^j National Machine Tool Builders Association; ^k Foundry Equipment Manufacturers Association; ^l American Bureau of Metal Statistics; ^m American Zinc Institute; ⁿ New York Commodity Exchange; ^o Copper Institute; ^p Department of Commerce; ^q Institute of Scrap Iron and Steel; ^r American Gear Manufacturers Association.

* Not available. † Monthly averages. ** Estimated.

The Iron Age Comparison of Prices

Advances Over Past Week in Heavy Type, Declines in Italics

	Nov. 26, 1940	Nov. 19, 1940	Oct. 29, 1940	Nov. 28, 1939
Flat Rolled Steel: (Cents Per Lb.)				
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10

Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate	\$5.00	\$5.00	\$5.00	\$5.00
Manufacturing ternes	4.30	4.30	4.30	4.30

Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10

Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55

Rails: (Dollars Per Gross Ton)				
Heavy rails	\$40.00	\$40.00	\$40.00	\$40.00
Light rails	40.00	40.00	40.00	40.00

Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00

Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	1.92
Skelp (grv'd.)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)				
No. 2 fdy., Philadelphia	\$24.84	\$24.84	\$24.84	\$24.84
No. 2, Valley furnace	23.00	23.00	23.00	23.00
No. 2, Southern Cin'ti.	23.06	23.06	23.06	23.06
No. 2, Birmingham	19.38	19.38	19.38	19.38
No. 2, foundry, Chicago†	23.00	23.00	23.00	23.00
Basic, del'd eastern Pa.	24.34	24.34	24.34	24.34
Basic, Valley furnace	22.50	22.50	22.50	22.50
Malleable, Chicago†	23.00	23.00	23.00	23.00
Malleable, Valley	23.00	23.00	23.00	23.00
L. S. charcoal, Chicago	30.34	30.34	30.34	30.34
Ferromanganese‡	120.00	120.00	120.00	100.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton. ‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melt'g steel, P'gh.	\$22.00	\$21.75	\$21.50	\$18.75
Heavy melt'g steel, Phila.	20.75	20.75	20.75	19.75
Heavy melt'g steel, Ch'go	20.25	20.25	19.75	17.25
Carwheels, Chicago	21.00	21.00	20.25	16.50
Carwheels, Philadelphia	23.25	23.25	22.75	21.25
No. 1 cast, Pittsburgh	22.25	22.25	22.25	19.75
No. 1 cast, Philadelphia	23.25	22.75	22.75	21.75
No. 1 cast, Ch'go (net ton)	18.00	18.00	17.75	15.00

Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	\$5.25	\$5.25	\$4.75	\$5.00
Foundry coke, prompt	5.75	5.75	5.25	5.75

Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.*	12.00	12.00	12.00	12.50
Copper, Lake, New York	12.00	12.00	12.00	12.50
Tin (Straits), New York	50.375	50.375	51.50	**54.50
Zinc, East St. Louis	7.25	7.25	7.25	6.50
Lead, St. Louis	5.65	5.65	5.35	5.35
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

*Mine producers only.
**Nominal.

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 98-104 herein. On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Composite Prices

FINISHED STEEL		PIG IRON		SCRAP STEEL	
Nov. 26, 1940	2.261c. a Lb.	\$22.61	a Gross Ton	\$21.00	a Gross Ton
One week ago	2.261c. a Lb.	\$22.61	a Gross Ton	\$20.92	a Gross Ton
One month ago	2.261c. a Lb.	\$22.61	a Gross Ton	\$20.67	a Gross Ton
One year ago	2.261c. a Lb.	\$22.61	a Gross Ton	\$18.58	a Gross Ton

High		Low		High		Low		High		Low	
1940	2.261c., Jan. 2	2.211c., Apr. 16		\$22.61, Sept. 19	\$20.61, Sept. 12			\$21.00, Nov. 26	\$16.04, Apr. 9		
1939	2.286c., Jan. 3	2.236c., May 16		23.25, June 21	19.61, July 6			22.50, Oct. 3	14.08, May 16		
1938	2.512c., May 17	2.211c., Oct. 18		23.25, Mar. 9	20.25, Feb. 16			15.00, Nov. 22	11.00, June 7		
1937	2.512c., Mar. 9	2.249c., Jan. 4		19.73, Nov. 24	18.73, Aug. 11			21.92, Mar. 30	12.92, Nov. 10		
1936	2.249c., Dec. 28	2.016c., Mar. 10		18.84, Nov. 5	17.83, May 14			17.75, Dec. 21	12.67, June 9		
1935	2.062c., Oct. 1	2.056c., Jan. 8		17.90, May 1	16.90, Jan. 27			13.42, Dec. 10	10.33, Apr. 29		
1934	2.118c., Apr. 24	1.945c., Jan. 2		16.90, Dec. 5	13.56, Jan. 3			13.00, Mar. 13	9.50, Sept. 25		
1933	1.953c., Oct. 3	1.792c., May 2		14.81, Jan. 5	13.56, Dec. 6			12.25, Aug. 8	6.75, Jan. 3		
1932	1.915c., Sept. 6	1.870c., Mar. 15		15.90, Jan. 6	14.79, Dec. 15			8.50, Jan. 12	6.43, July 5		
1931	1.981c., Jan. 13	1.883c., Dec. 29		18.21, Jan. 7	15.90, Dec. 16			11.33, Jan. 6	8.50, Dec. 29		
1930	2.192c., Jan. 7	1.962c., Dec. 9		18.71, May 14	18.21, Dec. 17			15.00, Feb. 18	11.25, Dec. 9		
1929	2.236c., May 28	2.192c., Oct. 29						17.58, Jan. 29	14.08, Dec. 3		

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average for basic iron at Valley furnace and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern Iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Summary of the Week

FRESH problems may confront the steel industry as it enters 1941, notably the one of wages. This has not yet reared its head openly, but behind the scenes are quiet activities which may result in a demand by the Steel Workers Organizing Committee for higher wages and the check-off as well. Organization work of the SWOC has stressed dues collecting, as various disturbances in the Pittsburgh district and elsewhere have borne out.

A voluntary wage increase of 5c. per hour has been granted by a small Ohio steel company and one of 10 per cent has gone into effect at a large machine tool plant in New England. In other sections of the metal-working industry wage controversies have come to the forefront, resulting in strikes in some instances.

The question of steel prices is bound up with that of wages. Steel company managements have stated publicly that there is no occasion for price advances so long as costs do not rise unduly. With Washington exerting constant pressure against higher prices for essential commodities, the steel companies will find themselves in a dilemma if a demand for wage increases should come after prices have been announced for the first quarter at a probably unchanged level.

With this situation in mind, steel companies are inserting "escalator" clauses more frequently in steel contracts as a protection against possible rising costs next year.

NEXT to labor, scrap is one of the most important elements in steel-making costs. Since the National Defense Advisory Commission exerted efforts some weeks ago to forestall a runaway scrap market, there has been a creeping upward movement of prices which is giving the steel companies some concern. After four weeks in which THE IRON AGE scrap composite price remained unchanged at \$20.67, it has moved up 33c. in three weeks to \$21. This week's advance was 8c. In some districts not included in the scrap composite there have been much greater advances. At Buffalo, St. Louis and Cincinnati the rise since Oct. 1 has been \$1.50, mostly in the past few weeks, while Cleveland and Youngstown prices have advanced 50c. No. 1 cast scrap during the same period has gone up from 50c. to \$2 a ton in various districts and other secondary grades have also advanced.

With the steel industry now operating at an annual rate of approximately 78,000,000 net tons of ingots against a practical capacity of about 83,000,000 tons and a potential capacity of 87,000,000 tons, orders continue in an unprecedentedly high volume, in many instances still exceeding production and shipments. Some companies will have booked 20 to 30 per cent more tonnage in November than in October, while others will barely equal their October total or may fall slightly below.

• Wage problem may confront the steel industry . . . One small mill advances hourly rates 5c. . . . A prominent machine tool builder grants 10 per cent increase . . . Question of future of steel prices bound up with wages, although first quarter quotations probably will be unchanged.

Considering the probability that a good deal of inventory building has been going on among those who might be adversely affected by Government priorities on steel, it is believed likely that present capacity will be ample for all essential purposes, including the 500,000 tons or so a month that Britain may require. Nevertheless, steel companies are moving toward elimination of possible bottlenecks. The Youngstown Sheet & Tube Co. by improvements will increase its capacity 200,000 tons a year and the Republic Steel Corp. will rebuild a blast furnace and install another 50-ton electric furnace, the fourth this year. Alloy steel is one of the scarcest items, deliveries now quoted ranging from 20 to 24 weeks in some instances.

Current steel operations are being hampered somewhat by the necessity for putting out open hearth furnaces for repairs, but the rate for the industry remains at last week's level of 97 per cent despite losses in some districts.

WITH automobile production still very high, that industry is using a large amount of steel, while orders for the railroads and for construction are increasing. Three roads have placed a total of 4850 cars. Car builders will be fully engaged at least through the first quarter. Railroads have also ordered a total of about 650,000 tons of rails this fall and an additional 300,000 tons is likely to be placed soon. Of the \$2,000,000,000 appropriated for defense construction, about \$1,000,000,000 worth of work is underway. This week's new fabricated structural steel projects of 36,225 tons include 18,000 tons for Air Corps hangars in various parts of the country. Structural awards amount to 25,700 tons. Household appliances are largely steel users, a market that may be enlarged by the considerable amount of defense housing to be constructed.

The British are negotiating for the construction of 60 ships, 30 of which will be assembled on the Atlantic Coast and 30 on the Pacific Coast. No existing shipways will be used and much of the work will be fabricated at interior structural steel plants.

The Industrial Pace . . .

HAVING CLIMBED STEADILY UPWARD during the past five weeks, operations in the production and distribution of heavy goods, as measured by THE IRON AGE index of capital goods activity, fell off somewhat in the week ended Nov. 23. The index stood at 121.0, a decline of 1.7 points from 122.7 in the previous period, but comparing with 113.1 a month ago, 99.1 in the week ended Nov. 25, 1939, and 103.4 in the corresponding week of 1929. Heavier steel ingot and automobile production was offset by a drop in heavy construction volume and a fall in lumber carloadings. The component reflecting production activity and shipments in the Pittsburgh district remained unchanged during the period.

The steel ingot series advanced 2.7 points against a declining seasonal trend to 145.7 from 143.0. Production for the week stood at 97 per cent of capacity, a new all-time peak, as against 96 per cent in the preceding week.

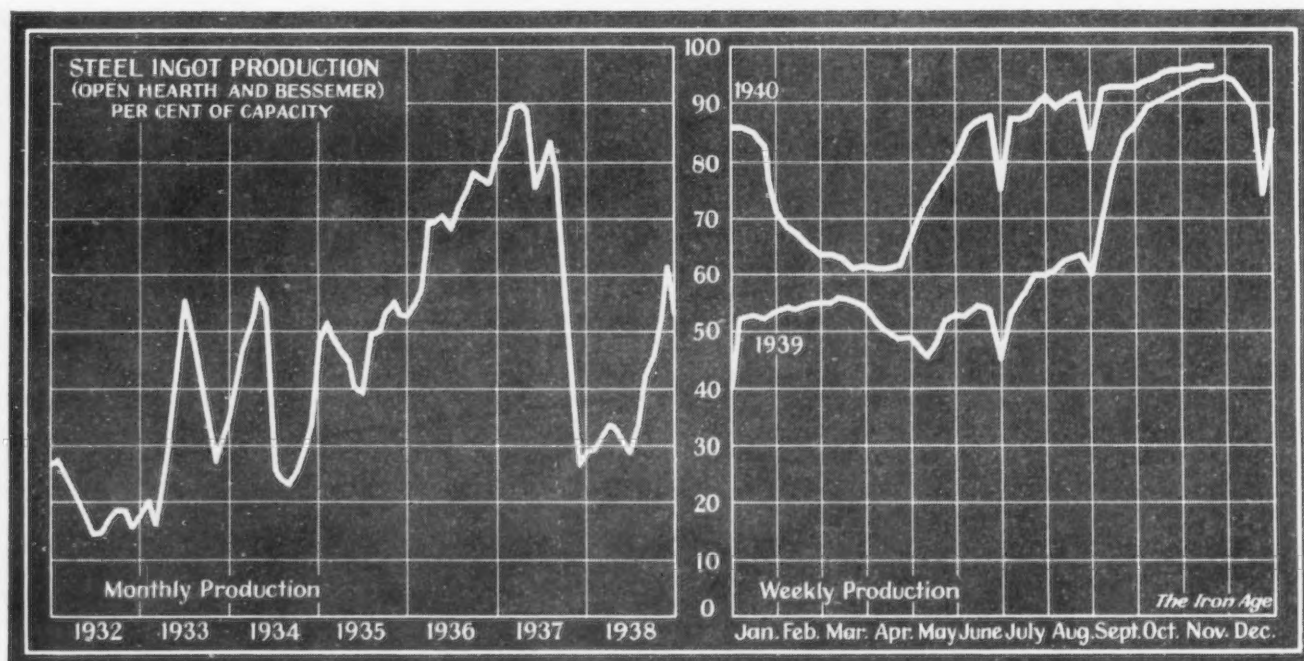
Making allowance for the short week resulting from the Thanksgiving Day (Nov. 21) holiday, the automobile component was up 1.1 points to 126.7 from 125.6 a week ago. Output was 102,340 cars, as compared with 120,943 units in the week ended Nov. 16.

Likewise affected by the holiday was the heavy engineering construction component, which was off to 143.8 from 147.8 in the week previous, but was well above the 128.6 of a month ago, 80.4 a year ago, and 110.3 in the corresponding week of 1929. The past week's awards totaled \$74,657,000, 46 per cent lower than \$139,119,000 in the previous week, but 57 per cent higher than the volume in the comparable week of 1939. Larger awards included \$11,255,000 for an aircraft factory in California, \$7,539,000 for military construction in Virginia, and \$6,019,000 for replacement centers in California.

PRICES OF METALS and metal products, according to the index figure published by the Bureau of Labor Statistics, were unchanged for the fourth successive week, being only 1.2 points above the level prevailing in the comparable week of 1939. The index at the present time stands at 97.4, last changed in the week ended Oct. 12, when the index was 96.4. A small decline in the price of tin during the week was counteracted by a rise in coke prices.

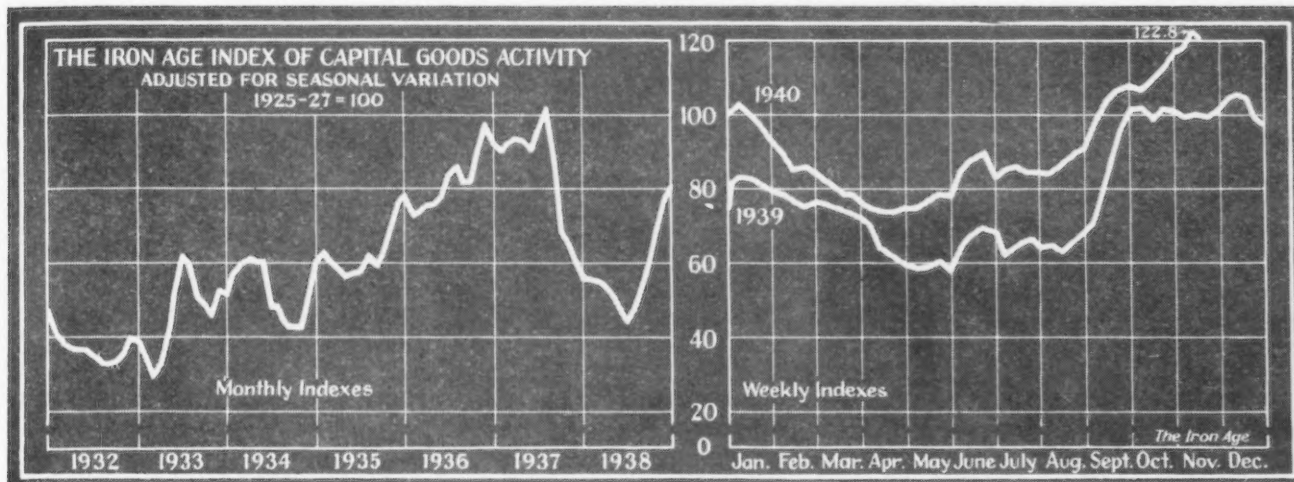
Railroad freight traffic in November shows a decline from the high levels prevailing in October. Estimated on a weekly basis carloadings of revenue freight in November total 3,933,000, or 786,600 cars a week. October shipments totaled 3,269,452, an average of 817,363 cars a week.

Ingot Output Holds at 97%



		Pitts- burgh	Chicago	Valleys	Phila- delphia	Cleve- land	Buffalo	Wheel- ing	Detroit	Southern	S. Ohio River	West- ern	St. Louis	East- ern	Aggre- gate
District Ingot Production, Per Cent of Capacity	Current Week ..	97.0	99.5	97.0	94.0	91.0	106.0	104.0	95.5	109.0	102.5	76.0	102.5	83.0	97.5
	Previous Week ..	96.0	100.0	97.0	94.0	93.0	106.0	104.0	100.0	106.0	107.0	76.0	100.0	83.0	97.0

Capital Goods Index Off Slightly In Week

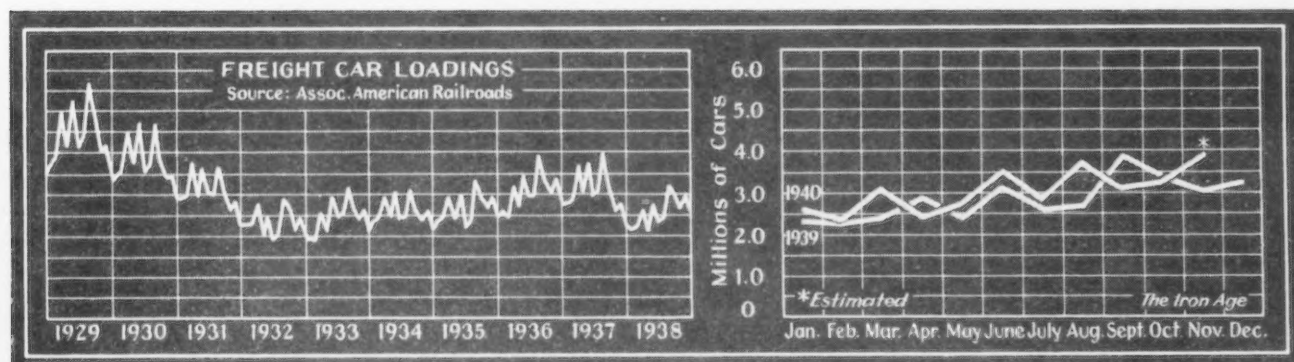


Component	Week Ended	Nov. 23	Nov. 16	Oct. 26	Nov. 25 1939	Nov. 23 1929
Steel ingot production ¹		145.7	143.0	138.2	140.7	102.2
Automobile production ²		126.7	125.6*	112.0	84.4	81.0
Construction contracts ³		143.8	147.8	128.6	80.4	110.3
Forest products carloadings ⁴		69.9	78.4	75.4	69.5	115.0
Pittsburgh output and shipments ⁵		118.9	118.9*	111.3	120.6	108.5
COMBINED INDEX		121.0	122.7*	113.1	99.1	103.4

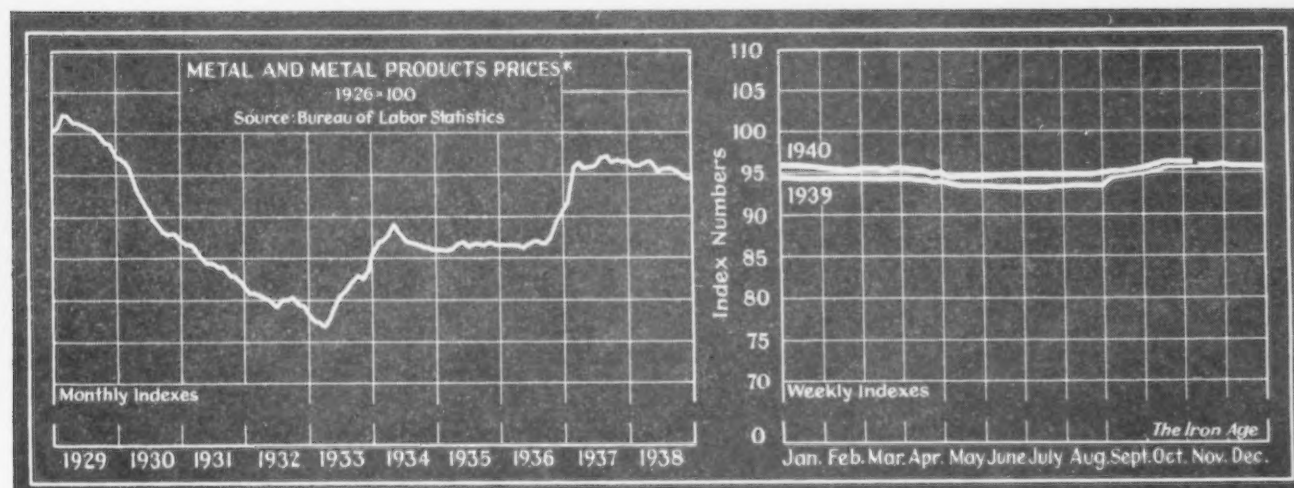
*Revised.

Sources: ¹THE IRON AGE; ²Wards Automotive Reports; ³Engineering News-Record; ⁴Association of American Railroads; ⁵University of Pittsburgh. Indexes of forest products carloadings and activity in Pittsburgh area reflect conditions as of week ended Nov. 16. Other indexes cover week of Nov. 23.

Weekly Freight Carloadings Decline In November



Metal Prices Unchanged At 1.2 Points Above 1939 Level



* Based on 147 items, including iron and steel, non-ferrous metals and finished products as agricultural equipment, automobiles, tools, bolts, etc.

Market News

...THE WEEK'S ACTIVITIES IN IRON AND STEEL

New Business

... Record levels at Pittsburgh
... In some districts November not quite equaling October

Steel orders at PITTSBURGH are establishing new record levels. Although October was an especially active month, specifications so far in November are from 20 to 30 per cent ahead. This showing is all the more remarkable in view of the restrictions being placed by steel makers in an attempt to prevent purely speculative buying. For several weeks incoming business has been running well ahead of both production and shipments. In addition to the strong domestic demand trend, buying by the British remains at substantially the same level as a week ago, either in the form of actual specifications or in known commitments.

Shipments continue to fall behind incoming orders at Chicago. Backlogs at practically all mills average two months and deliveries are lengthening. October was one of the record-breaking periods for that district and November business declined only slightly. All orders, with few exceptions, are for the first quarter, with February and March delivery promises increasing. One company offers certain sizes of sheared plates for the second quarter of 1941.

CHICAGO steelmakers believe they are still to feel the real impact of domestic defense business. Those areas west of CHICAGO are just beginning to notice direct defense orders. General demand is still very strong in that sector and many non-defense consumers are anticipating future needs now. About the only consuming industries not up to capacity there are tin plate users and suppliers of the oil business. Indicative of heavy railroad buying were orders for 2700 freight cars placed last week, the steel for which will be furnished by CHICAGO mills. Household appliance manufacturers are ordering imposing tonnages. Structural shapes and plates grow in impor-

tance each week with construction projects springing up on all sides.

At CLEVELAND November shipments of steel will be off slightly from October, due to the two less working days this month. Shipments to the British are up sharply, including tonnage rolled in October but not moved that month. Aggregate orders at CLEVELAND will finish close to the October volume and in a few divisions will be ahead of the previous month's bookings. December holds promise of being very active at CLEVELAND.

"Escalator" clauses are appearing more and more in contracts governing steel purchases, as a protection against possible rising costs next year.

Bookings at BIRMINGHAM this month are keeping pace with record orders for October. Railroad buying features new business for that district with the Bessemer plant of the Pullman-Standard Mfg. Co. receiving orders for 2250 cars, 1750 from the Louisville & Nashville and 500 from the Seaboard Air Line. The Seaboard also has placed an order for 12,300 tons of rail with the Tennessee Coal, Iron & Railroad Co. Mills are hard-pressed to supply for present demands. One mill is reported to be booked up on plates for five months.

Estimated requirements of the newly reorganized Cramp Shipbuilding Co., at Camden, N. J., for the construction of the six cruisers contracted for by the Navy include 13,200 tons of plates, 12,000 tons of armor plate, 1800 tons for forged plates, 1000 tons of rivets and bolts, 720 tons of bars, 450 tons of seamless tubing, 300 tons of sheets, 150 tons of welded pipe, and 54 tons of brass sleeves. Although not all mills in the PHILADELPHIA district have officially sold for first quarter delivery on the basis of prices in effect at that time, many have sold very heavy tonnages. Shipments of much of the steel bought recently at other mills will unavoidably run over well into next year.

Shipments from BUFFALO mills in November are expected to be about 10 per cent ahead of the Oc-

tober totals, according to unofficial estimates of mill officials. New orders continue at about the same rate with the demand evenly spread for structural, plates, sheets and bars.

Pacific Coast fabricators almost universally report capacity operations, with substantial backlogs. Demand for fabricated steel for defense construction chiefly by the Navy continues heavy, with the bulk of these inquiries yet to come in definite form. Nearly as great as the volume occasioned by government military construction is the tonnage required for plant construction, particularly for plants tributary to the aircraft industry.

A steady flow of orders, principally for defense projects, is being received in ST. LOUIS, with consumers buying ahead to protect against extended deliveries.

Steel Operations

... Rate is unchanged at 97 per cent ... Some furnaces out for repairs

Although a number of open hearth furnaces have been put out for repairs, ingot production for the industry as a whole remains substantially at last week's level of 97 per cent. Under the severe pressure on steel melting equipment minor fluctuations in the industry operating rate and for individual districts are likely to occur more frequently from now on.

Prices

... Announcement for first quarter expected momentarily

Although no intimation has been given as to just when a price announcement covering first quarter will appear, interest in the matter has waned somewhat owing to the general assumption among sellers and buyers that there will be no changes. If long-established custom is followed, the announcement by the Carnegie-Illinois Steel Corp. should appear not later than Dec. 1.

Semi-Finished Steel

... Much more could be sold if it were available

The recent gain in flat rolled steel demand is being reflected in increased requirements for sheet bars from non-integrated steel makers. Total semi-finished specifications at PITTSBURGH are still running ahead of a month ago, skelp is moving briskly, and if more semi-finished steel were available for the market it could be easily sold.

At CLEVELAND and YOUNGSTOWN the semi-finished steel market is becoming tighter and tighter. Newcomers without a preference rating find sellers unable to offer any encouragement. Promises on hot rolled rods remain extended into February for popular sizes.

CHICAGO forgers are important buyers, being booked to capacity in practically all cases. Defense contracts for 105 mm. howitzer carriages and 155 mm. gun carriages promise important tonnage.

Pig Iron

... Supplies are tight but no shortage exists

Steel making iron continues tight at PITTSBURGH and total pig iron shipments remain at high levels but regular customers are being taken care of by their normal source of supply.

CHICAGO producers noted a slight dip in November figures compared with those for October. Though demand is heavy from all sides, with foundries increasing their needs daily, all customers are receiving their pig iron requirements in an orderly fashion. Producers have all their furnaces on and visualize no difficulty in supply. Prices are expected to be re-affirmed for first quarter.

Output sufficient for consumer demand continues to be a major problem for merchant iron producers at BIRMINGHAM. Production remains at capacity with all 18 of the district's furnaces in blast.

Awaiting the opening of books for first quarter, expected shortly, PHILADELPHIA iron sellers continue efforts to satisfy customers' needs

in the face of dwindling supplies. Shipments, which for some time have been consistently heavier than production, have reduced furnace stocks far below normal levels. Foundry operations continue heavy.

The rebuilt blast furnace of the Hamilton Coke & Iron unit of the American Rolling Mill Co. was re-lighted on the 20th. It is expected that this stack will produce approximately 600 to 700 tons daily until new coke ovens have been completed, at which time it will be operated at its capacity of 800 tons.

Republic Steel Corp. has awarded the contract for rebuilding and improving its No. 4 blast furnace at YOUNGSTOWN to John Mohr & Sons, Chicago. It is expected that the stack will be taken out of blast prior to the holidays. The furnace produces steel-making iron.

Coke

... Connellsville furnace grade nominal at \$5 to \$5.25

With little or no spot Connellsville furnace coke available, the price on this grade is more or less nominal at \$5 to \$5.25 a ton f.o.b. Connellsville. Some pig iron makers have made deals for first quarter requirements at \$5, some at \$5.25, and this past week a merchant furnace near PITTSBURGH signed up for first quarter beehive furnace coke at \$5.50 a ton f.o.b. Connellsville. It appears that most beehive furnace contracts, if closed soon, will be within the range of \$5.25 to \$5.50 a ton f.o.b. Connellsville. Practically all production is taken up by contract shipments and only occasional cars of material are available for spot sales.

Production of beehive and byproduct coke during October amounted to 5,202,764 tons, the U. S. Bureau of Mines reports. This represented an increase of 303,563 tons, or 6.2 per cent over the output in September. On a daily basis, the rate of production was stepped up 2.7 per cent.

Coke from byproduct ovens totaled 4,839,664 tons in October, an increase of 4.6 per cent over the preceding month. Production of beehive coke, where more and more ovens are being reconditioned and fired, rose from 271,800 tons in September to 363,100 tons in October, an increase of 33.6 per cent.

Byproduct furnace plants increased their production by 4.3 per cent in October and also drew 36,676 tons from their stocks to meet the increasing demand of the steel industry. Coke from merchant plants, operating at only 82.8 per cent of capacity, showed a larger increase in production for the month than the furnace plants and even added slightly to their supply on hand.

The stocks of byproduct coke on hand at producers' plants at the end of October stood at 2,029,395 tons, a decrease of 28,141 tons, or 1.4 per cent.

Shipbuilding

... British plan to build 60 ships is in negotiation stage

Plans are progressing for the construction of 60 steel cargo ships in the United States for the British government. It is understood that no existing shipways will be used, it having been made plain to the British that facilities not now in use must be drawn upon. The program is said to contemplate the assembly of 30 ships on the Atlantic Coast and a like number on the Pacific Coast. The assembly work probably will be undertaken by general construction contractors rather than by shipbuilding companies, while the ship parts will be fabricated by plants in the interior such as structural and plate fabricating shops. The 60 ships are expected to call for 180,000 tons of steel, specifications for which will begin to flow to the mills soon.

Contracts totaling \$13,030,000 for eight minesweepers to require a total of 2500 tons of steel were awarded last week to these companies: General Engineering & Drydock Co., Alameda, Cal., four at \$1,680,000 each; Defoe Boat & Motor Co. Works, Bay City, Mich., four at \$1,577,500 each.

Coast Guard Headquarters in WASHINGTON has announced that it received only one bid in response to invitations for tenders for the construction of two cutters. The Sullivan Dry Dock & Railway Corp., Brooklyn, submitted a bid of \$849,000 for the construction of one 180-ft. cutter. The other cutter for which no bid was received is a 200-ft. vessel.

Reinforcing Bars

... Price situation on rail steel not yet clarified

With one large Midwestern rail steel reinforcing bar maker being the only one so far to place this product on a price parity with new billet reinforcing bars, this market picture is still unclarified. Reports have circulated that all rail steel reinforcing bar makers have placed their product on a parity with new billet reinforcing bars but this probably resulted from confusion caused by the definite announcement by several companies that rail steel merchant bars were priced the same as new billet merchant bars.

Reinforcing steel awards of 12,850 tons include 2900 tons for the Panama Canal; 2150 tons for a sector hospital and nurses quarters in the Canal Zone; 1430 tons for the United States Engineer at San Francisco, and 1000 tons for Navy housing and ammunition facilities at Yorktown, Va.

New reinforcing steel projects total 4700 tons. The largest inquiries are 1000 tons for the Heath Street housing project, Boston, and 1000 tons for sewers in Queens, N. Y.

Plates

... Deliveries range from eight to 14 weeks in some cases

With high speed mills making daily records on plate production and with promises on some sizes being given for March and April delivery, fresh plate orders are still rolling in. Shipbuilding has taken a heavy proportion of current shipments, but equally as large are requirements from tank makers, freight car builders, and fabricating shops.

Heavy demand of railroads is a leading factor in the mounting plate backlogs among CHICAGO steelmakers. Most car builders in that area are booked up to capacity and are pressing for steel deliveries. Deliveries are lengthening, averaging about eight to 11 weeks, and certain sizes of sheared plates are not promised before the second quarter of 1941 at one mill.

CLEVELAND reports that obtaining plate deliveries earlier than late

January is virtually impossible and in some sizes February shipment is now being quoted.

Railroad Buying

... Three roads order total of 4850 freight cars ... Car builders have large backlogs

With the placing of 4850 freight cars by three railroads, the country's railroad car builders now have backlogs which will keep most shops busy at least through the first quarter of 1941. An additional placement of approximately 10,000 cars would probably assure operations at an unchanged level to the end of the second quarter.

The roads which have placed substantial orders in the past week are the Louisville & Nashville, Bessemer & Lake Erie and the Seaboard Air Line. The L. & N. order totalled 3150 cars divided as follows: 1600 50-ton hopper cars, 100 automobile box cars and 50-70-ton gondola cars to Pullman Standard Car Mfg. Co. and 1400 50-ton hopper cars to American Car & Foundry Co. The Bessemer & Lake Erie ordered 1000 cars, of which 650 90-ton hopper cars will be built by the Pullman Standard, 300 50-ton box cars by Greenville Steel Car Co. and 50 50-ton flat cars by the Magor Car Corp. Seaboard Air Line has ordered 700 cars, of which 500 50-ton box cars will be built by Pullman Standard and 200 90-ton hopper cars by Bethlehem Steel Co.

Bessemer & Lake Erie has bought two type 0-8-0 switching locomotives from American Locomotive Co. and five type 2-10-4 Texas locomotives from the Baldwin Locomotive Works. The Atchison, Topeka & Santa Fe has ordered 20 light-weight passenger cars from the Edward G. Budd Mfg. Co.

The Louisville & Nashville's expenditure for equipment just ordered will total \$7,527,271. Authority has been asked of the ICC for issuance of \$6,770,000 in equipment trust certificates.

So far this fall American railroads have ordered approximately 650,000 tons of rails for 1941 delivery. More than 300,000 tons additional may be ordered before the end of the year. Recent rail orders include 55,000 tons divided by the Santa Fe among the Carne-

gie-Illinois Steel Corp., Inland Steel Co. and Colorado Fuel & Iron Corp., and 10,000 tons divided by the Wabash among Carnegie-Illinois, Inland and Bethlehem.

Railroad car builders are asking railroads to place orders as soon as possible so as not to contribute to an avalanche of business occurring at one time similar to what took place last fall.

With more than 55,000 freight cars ordered since the first of the year, it is expected that by the end of December more than 60,000 will have been ordered. When the national defense program gets into full sway, this is expected to be reflected in a continuation of the present rate of new freight car purchases.

Analysis of domestic freight car bookings for the first 10 months of 1940 shows the following allocation to various car builders: Railroads own shops, 14,140; Pullman Standard Car, 12,410; American Car & Foundry Co., 7719; Pressed Steel Car Co., 5232; Bethlehem Steel Co., 2825; General American Transportation Co., 3666; Mt. Vernon Car Mfg. Co., 1630; Ralston Steel Car Co., 1000; Virginia Bridge Co., 1000; Greenville Steel Car Co., 738; Magor Car Corp., 245; miscellaneous, 127; a total of 50,732.

Bolts, Nuts and Rivets

... Sales are approximately at October level

Strong demand for light items and increasing sales of heavy hot items feature the bolt and nut market at CLEVELAND. In general, sales volume is roughly similar to the October proportion. Several carloads of cap screws for Army tanks have been included in recent business. On the heavy items, production machinery which has been idle or little-used for years is now beginning to operate.

Structural Steel

... Air Corps hangars call for 18,000 tons

Fabricated structural steel awards at 25,700 tons are slightly higher than last week. Sizable lettings include 2000 tons for the Aluminum Co. of America at Vancouver, Wash., which is in addi-

tion to 2500 tons awarded a few weeks ago; 1800 tons for cracking towers at Bayway, N. J., and Baton Rouge, La., for the Standard Oil Co. of New Jersey; 1700 tons for a shop building at the Boston Navy Yard; 1650 tons for a turret shop at Camden, N. J., for the New York Shipbuilding Corp.; 1500 tons for a pier at Wake Island, in the Pacific Ocean; 1325 tons for mineshafts at Ishpeming, Mich., for the Cleveland-Cliffs Iron Co.; 1200 tons at Ravenna, Ohio, for the first 17 buildings of an ammunition loading plant; 1100 tons for moveable traffic separators for the Chicago park district, Chicago; 1100 tons for a Norfolk & Western warehouse at Sewall's Point, Va., and 1000 tons for an airplane repair dock at Duncan Field, San Antonio, Tex.

New structural steel projects dropped to 36,225 tons from 41,910 tons a week ago. Outstanding inquiries are 18,000 tons for the War Department for 72 air corps hangars at various locations; 5000 tons for an elevated parkway in Brooklyn for the Triborough Bridge Authority; 1625 tons at Pittsfield, Mass., for a plant, mill building and crane runway for the General Electric Co.; 1500 tons at the Mare Island Navy Yard, Cal., for an electric shop, steam test building and other facilities.

Merchant Bars

... New tonnage heavy ... Deliveries 60 to 90 days

With deliveries in some cases extended for as much as 60 to 90 days, and with total demand more widely diversified than at any time for many years, hot rolled bar specifications continue to expand at PITTSBURGH. Automobile manufacturers, bolt and nut makers, and cold drawers are specifying heavily and obviously some of this new business is in anticipation of future needs, as most bar consumers at least want to get on mill order books to assure future delivery. Strong buying is emanating from jobbers. Tonnages destined for armament work continue to increase.

Cold finished bar makers have noted recently an expansion in jobber requirements, a broadening in miscellaneous buying, and a slow but steady expansion in orders from

government arsenals and private companies making munitions.

About 2000 tons of cold drawn bars will be placed in the CHICAGO district by manufacturers in that area who were among the successful bidders for a large government order of around 4000 sets of bomb fuses, which are ordered 100 fuses to the set. Producers in that district will also come in for a large share of the 15,000 tons of steel which will be needed for 105 mm. howitzers and howitzer carriages and 155 mm. gun carriages.

Although February delivery on small bars is the best which can be secured currently at CLEVELAND and YOUNGSTOWN, slightly earlier shipment may be possible in some cases, unless last-minute emergency tonnage becomes heavy. Production is increasing and mill schedules for December and January are very favorably arranged. New business received up to Nov. 25 indicated this month will be heaviest of the year.

Tubular Goods

... Merchant pipe and mechanical tubing the most active

Merchant pipe requirements, enlivened somewhat by cantonment work, are easily the most active portion of the tubular market at PITTSBURGH. Mechanical tubing is in brisk demand and oil country goods specifications are changed but little from a month ago. Oil country goods activity has been hampered by seasonal dullness which always precedes new year appropriations.

Electric weld mills are hard pressed to meet the unusual demands of the construction field for conduit boiler tubes and other pipe. One mill has been buying strip generously on the outside. Order backlogs include fair tonnages for export.

Wire Products

... Orders continue at a high level

Mill schedules for rods and manufacturers' wire remain well extended at CLEVELAND. Even nails are not obtainable immediately. Mesh, wire rope and other construction items continue in heavy demand. In addition to defense business, the flow of regular requirements is exceptionally well maintained.

The volume of wire and wire product sales at PITTSBURGH is substantially unchanged from a week ago. Orders booked so far this month are likewise about on a par with a month ago.

Sheets and Strip

... Backlogs now extend into February at some mills

Total sheet buying leveled off slightly in PITTSBURGH in the past week, but orders so far this month are well ahead of a month ago. Deliveries are further extended and some of the apparent decline in new business may be due to the reluctance of some mills to accept fresh orders, unless they are to be shipped at mills' convenience.

CLEVELAND reports that backlogs on some items now extend into February, depending upon the particular producers' capacities and bottlenecks, the amount of automotive business booked, and whether many continuous mill plates are being rolled and numerous other factors. Delivery promises on stainless strip may be obtained in eight to 10 weeks at one mill and 10 to 12 at another.

Home appliance manufacturers, automotive manufacturers and parts makers lead in the consumption of sheets at CHICAGO. An order for 5000 galvanized metal buckets will soon be placed by the Quartermaster's Depot there. Wide strip, 2½ to 8 in., has lengthened in delivery by two weeks at one mill.

A leading producer has made minor revisions in the list of extras and deductions for long ternes and copper steel roofing long ternes. Width extras have been added for four classifications under 6 in. The previous classification just being "under 6 in." Extras have been also set up for semicircles which amount to 10c. a 100 lb. more than the extras for circles.

Tin Plate

... Some consumers are buying for 1941

Some tin plate users are anticipating their requirements for the early part of 1941, and these orders have brought about a slight improvement in total tin plate orders. Operations are slightly higher than a week ago. Export trade is not active.

Machine Tools

... SALES, INQUIRIES AND MARKET NEWS

Curtiss-Wright Ordering

Cleveland

• • • One of the best recent indications of activity by machine tool producers here is found in the revelation that November bookings at one of the leading turret lathe plants shot ahead of November production capacity about the middle of this month and since then have continued at a high rate. Present capacity is roughly 300 machines a month, which will be increased to 450 a month in 1941.

From Columbus comes word that officials of Curtiss-Wright Corp. on Nov. 6 began placing orders for more than \$1,000,000 worth of machinery which will be installed in a temporary factory building on the State fair grounds and in the new plant at Port Columbus. Considerable miscellaneous equipment will be purchased for this Columbus plant later on.

National Acme Co. here is reported to have an unprecedented order backlog approximating \$15,000,000, highest in 20 years or more. President Fred Chapin said that at the present rate of operations the plant, which now employs around 2550 factory workers, would be busy for the next year and a half.

No Let-up at Cincinnati

Cincinnati

• • • District machine tool builders still see no let up in the steady flow of orders. Current demand is holding at approximately the October level, which for some was the biggest month in their history. Defense needs continue to increase. Of course, it is difficult for manufacturers to analyze orders from normal customers and determine definitely that tools ordered will go into defense production. Nevertheless, almost irrespective of the source of business, buyers are insisting upon the priorities in delivery. Recent change in the Washington set-up on awarding priorities is expected to assist in scheduling production, although the problem is still a hard one. A modicum of relief, so

Serious Bottlenecks Reported In Gages

Washington

• • • Steps to end what is described as a serious bottleneck in the defense program was taken by the War Department on Monday when it sent letters to four companies, authorizing the immediate expansion of facilities for the production of gages.

Letters were sent to Sheffield Gage Corp., Dayton, Ohio; Pratt & Whitney Division, Niles-Bement-Pond Co., Hartford, Conn.; Taft-Peirce Manufacturing Co., Woonsocket, R. I., and Greenfield Tap & Die Corp., Greenfield, Mass.

These four companies under the terms of the letters of intent will finance the expansion themselves to be repaid by the government over a five-year period. During the interim, they will rent these added facilities from the government for the manufacture of gages required by all phases of the armament program.

far as production is concerned, is reported from the system of developing new mechanics through learner systems, but there is still broad opportunity for more men. Plant expansions are still in the discussion stage, with one or two interests rapidly pushing toward more concrete data. As yet, however, no announcements have been made and so far as reports are available nothing has reached the final blue print stage.

Tool Plants Are Expanding

Chicago

• • • Machine tool orders continue to flow into this district and manufacturers are now enlarging plant facilities on a fairly broad scale. In Rockford, Ill., Sunstrand Machine Tool Co. will increase production about 20 per cent. W. F. & John Barnes Co. will soon occupy an addition. Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., has one addition underway and is buying equipment. A Chicago firm is about ready to release

expansion plans which will involve a new plant and equipment purchase involving several million dollars. Among important machine tool customers, Bendix Products division of Bendix Aviation Corp. is building a 150,000 sq. ft. addition and will soon place important equipment orders. Curtiss-Wright is erecting an \$11,000,000 plant in St. Louis which will employ 10,000 men and require an imposing quantity of new machinery. With orders coming in fast and many manufacturers sold out for next year, the machine tool industry is doing its best in this area to increase facilities so that the tremendous business on hand can be handled with reasonable speed.

Warner & Swasey's New Plant Is Inspected

Cleveland

• • • The 110,000 sq. ft. of new floor space added by Warner Swasey Co., as well as the older portions of the plant where production has been rearranged, were inspected by a large number of the machine tool company's friends and customers, here, Nov. 15.

Bottlenecks and backtracking have been eliminated to a great extent, the visitors found. Turret lathe output has been stepped up sharply.

The new structure contains the final assembly and inspection departments for heavy lathes; the gear grinding department; the shipping department; locker rooms and tool cribs. Part of the planning department extends into the new addition, as does the stock room in the basement. Modern ventilating, heat control and illumination are provided.

In the old building, such departments as the turret lathe division and tool room have been moved, while the engineering department is given more space. Smaller parts are all machined on upper floors.

Much new equipment is found through the plant.

Non-Ferrous Metals

... MARKET ACTIVITIES AND PRICE TRENDS

With the recent tapering off of activity in lead buying, all major non-ferrous markets presented a more quiet appearance in the past week. Most buyers have just about taken care of their immediate needs and for additional tonnages must wait for sellers to proceed on the basis of allocation policies, now in effect in the copper and zinc markets. Producers are concentrating on the problem of maximum production and the expedition of deliveries for the most pressing needs of consumers.

On a quiet scale sales of electrolytic copper during the past week were in satisfactory volume, with all large producers at 12c. a lb., delivered Connecticut Valley. Custom smelters lowered their offering prices during the week and some consumers who found themselves in need of spot metal were able to obtain it at 12.375c. Orders for shipment between now and January constitute only a small part of total sales since large producers generally are sold through February. The export market was quoted at 10c. to 11c. a lb. f.a.s. during the week. Moderate tonnages were again booked on that basis, without absorbing all offerings.

Lead

Lead statistics for October place domestic shipments during that month at 62,496 tons, somewhat less than the 1939 monthly high in October of 66,060 tons, but 9040 tons more than was shipped in September of this year. Stocks at the end of the month were 35,386 tons, the lowest since December, 1927, when 32,366 tons was on hand, and down 5906 tons from the September figure. Production totaled 56,600 tons, 5159 tons higher than the September output, as the result of the increased use of foreign raw materials.

Tin

Fluctuating between 50.25c. and 50.375c. a lb., delivered New York, during the past week, prices gen-

erally failed to attract buyers and the market was little, if any, more active than it was in the preceding week. Early this week a few consumers appeared in the market willing to take moderate tonnages at the government buying level of 50c. c.i.f. New York, but sellers were not anxious to do business. The past week saw a few transactions closed on this basis. Prompt Straits metal is quoted today at 50.375c. per lb., delivered New York. Unusually large tonnages arriving here over the holiday place total arrivals so far this month at 8740 tons.

Zinc

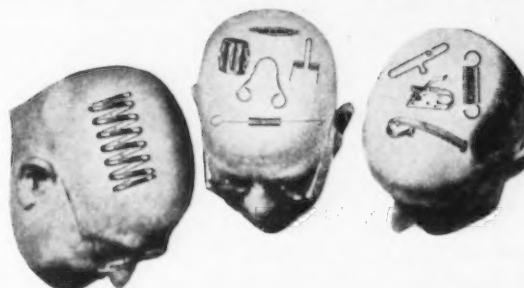
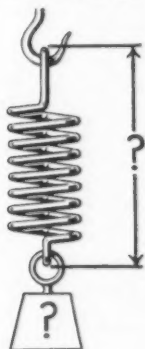
With producers booked heavily through the first quarter of next year, and substantial tonnages for

second quarter having been taken, intermediate interests, have had no difficulty in obtaining premiums for closer delivery. Metal for delivery through January to March has been sold for prices ranging up to 8.50c. per lb. Major producers continue to quote 7.64c. a lb., on prime Western metal, delivered New York, although much of the business done recently, has been on an average price basis. Sales of prime Western during the past week totaled 6518 tons, more than twice as much as the previous week's total of 3069 tons, and were somewhat higher than the volume indicated earlier in the week. Shipments of 5393 tons compared with 5735 tons in the preceding period. Unfilled orders now amount to 117,217 tons.

(Non-ferrous prices on page 99)

the practical side of Springmaking — BY DUNBAR

"We don't know
all about
Springs
... but all we DO
know is Springs"



We recommend a weight test in the specifications of extension springs. The tolerance desired on that specification will tell whether no test, a spot test or 100% test is necessary. As this factor can vary the cost of a spring, it is plain that easy tolerances can save you money.

There are other savings in style of end, correct material, finish, method of assembly, proper initial tension.

You may be paying for spring quality you don't need—or you may find that a *better* spring can bring you savings. It's up to a good springmaker to help you find out.

FOR PRACTICAL SPRING ADVICE, CALL ON

Dunbar Bros. Co., Bristol, Conn.

DIVISION OF ASSOCIATED SPRING CORPORATION

"Quality Springs Since 1845"

Scrap

... MARKET ACTIVITIES AND QUOTATION TRENDS

Although many leading scrap brokers and dealers have been preaching stabilization of prices for some weeks, quotations on many important grades have been edging upward. As a result of a rise of 25c. this week in the average at PITTSBURGH for No. 1 heavy melting steel, THE IRON AGE scrap composite price moves up to \$21. While this is a gain of only 33c. over the average which ruled for a few weeks after efforts were initiated by the price division of the National Defense Advisory Commission to prevent a runaway market, individual items in various markets have advanced much more than the scrap composite (which is an average of Pittsburgh, Chicago and Philadelphia) would indicate.

Comparing this week's quotations with those of the first issue of October (dated Oct. 3), No. 1 heavy melting steel has gone up 75c. at PITTSBURGH, 50c. at CHICAGO and only 12½c. at PHILADELPHIA, but at BUFFALO, ST. LOUIS and CINCINNATI the rise has been \$1.50, at CLEVELAND and YOUNGSTOWN 50c.

No. 1 cast scrap has gone up in this period to an even greater extent. For example, at PITTSBURGH, where steel scrap has risen only 75c. since Oct. 1, No. 1 machinery cast has gone up \$2. There has been a rise of \$1 at PHILADELPHIA, where steel scrap has barely moved. In other markets this grade has advanced 50c. or more, the sharpest rise being at BOSTON, where a minimum of \$17 prevailed the first week of October against \$20 now.

Current scrap markets are characterized by an absence of important mill buying, but the undertone everywhere is strong.

Pittsburgh

The scrap market here is strong and an appraisal of current conditions warrants \$1 spread on No. 1 heavy melting of \$21.50 to \$22.50, up 25c. from last week's average. Broker and consumer buying has taken place within these ranges during the past week. On the basis of sales into consumption, railroad heavy melting steel is quoted this week at \$23 to \$23.50, up 50c. a ton from last week. Secondary grades remain strong.

Philadelphia

No. 1 cupola cast moved up 50c. to \$23 to \$23.50 on the basis of sales during the week. All other grades re-

mained firm and unchanged and the tightness in the supply of foundry material continued. One important factor in the local price situation has been the availability for domestic use of large tonnages of scrap formerly exported.

Chicago

No. 1 heavy melting steel is unchanged, remaining at \$20 to \$20.50. Mill purchasing follows a sluggish pace and little material is being offered. There are reports of some brokers paying \$20.75 for No. 1 heavy melting steel but no mills have met this figure. The general market is firm. Prices throughout the list are unchanged.

Youngstown

Prices continue in a narrow range here but fresh mill sales have been lacking. There are indications that better activity may be forthcoming before long. Consumption may be benefited by temporary curtailment of hot metal output.

Cleveland

The market here is quiet but strong and shows a tendency to creep upward. Awaiting the time when outside markets might begin attracting scrap from here, dealers are holding on to their material. Support is being added by the high rate of consumption and the dwindling navigation season.

Buffalo

The market here remains firm despite the fact the area's largest consumer is holding up shipments until at least Dec. 2 while crews are unloading "outside scrap" from boats. On the basis of a sale of approximately 12,000 tons of No. 1 heavy melting steel last week within the \$21.50 to \$22 range, major scrap items move up another 50c. and the \$1.50 differential on No. 2 heavy melting scrap broadens again to \$2. Borings and turnings also are up 50c.

St. Louis

Covering by dealers has caused melting steel grades to advance 25c. a ton in St. Louis, with some specialty items advancing 50c. and the market generally strong. Country dealers are holding their piles, and are paying close to the prices for prepared material. No sale of consequence to the mills was made.

Cincinnati

Dealers are attempting to stabilize prices, but the heavy demand for scrap combined with the reluctance of producers to release at present prices will unquestionably cause a tension that will have to be relieved by an advance. Currently, prices are unchanged and mill interests generally are exerting pressure to maintain the present level. Dealers indicate, however, that they are able to sell scrap without much difficulty but are having some trouble

in attracting ample quantities into the market.

Birmingham

The market undertone here is showing added strength with an increasing shortage in scrap of all grades. Especially heavy demand for cast items reflects the booming activity of foundries in the district.

Detroit

With a last minute scramble to fill boats for ports which will close within a week or so, there is an underlying current of strength in the Detroit scrap market. December automotive lists will close Thursday and Friday of this week with tonnages approaching record offerings of the past.

New York

No changes are reported in the scrap market in which the tension between steady prices and increasing demand for material is becoming more and more acute.

Boston

Business is better and prices firmer. Steel turnings and heavy melting steel hold the center of interest. Less than a week ago one broker was paying \$9.15 a ton on cars for steel turnings while another was paying \$9.50. Then Phoenix interests came into the market at \$9.65 a ton, almost immediately dropped to \$9.40 and then withdrew, all within one day. The \$9.40 price, however, did not draw out scrap because brokers paid \$9.50. Currently the market has settled to a \$9.25 to \$9.50 a ton f.o.b. basis. For Bethlehem Steel Co., Sparrows Point delivery \$15.50 a ton f.o.b. barge Providence, R. I. is paid for No. 2 steel. For American Steel & Wire Co., Worcester, Mass., \$14.75 to \$15 on cars, Providence, and \$15.50 elsewhere are paid for No. 2, while \$17 is paid for No. 1. The export market on steel has dropped about \$1 a ton, but is nominal because no material is being purchased for export.

Milwaukee

For the first time in years the municipal docks are bare due to the heavy demands from domestic and Canadian mills. So far this year about 42,000 net tons have been shipped in 17 cargoes and, with an estimated two more cargoes to go, the tonnage will come close to the 51,756 tons shipped in 1939. The highest volume was 66,079 net tons in 1937. In 1938 the tonnage slumped to 12,961.

Toronto

While prices are unchanged, the trend is strong with some dealers paying above list for some materials to meet consumers' demands. Inquiries from the Hamilton and Niagara areas are more numerous and tonnages asked for are in excess of the actual supply.

IRON AND STEEL SCRAP PRICES

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$21.50 to \$22.50
Railroad heavy mltng.	23.00 to 23.50
No. 2 heavy mltng.	20.00 to 20.50
Railroad scrap rails	23.00 to 23.50
Rails 2 ft. and under	27.00 to 27.50
Comp. sheet steel	21.50 to 22.50
Hand bundled sheets	20.50 to 21.00
Heavy steel axle turn.	20.75 to 21.25
Heavy steel forge turn.	19.75 to 20.25
Machine shop turnings	15.50 to 16.00
Short Shov. Turn. Alloy	
Free	17.00 to 17.50
Mixed bor. & turn.	14.75 to 15.25
Cast iron borings	15.00 to 15.50
Cast iron carwheels	22.50 to 23.50
Heavy breakable cast.	17.50 to 18.00
No. 1 cupola cast.	22.00 to 22.50
RR. knuckles & coup.	27.00 to 27.50
Rail coil springs	27.00 to 27.50
Rail leaf springs	27.00 to 27.50
Roller steel wheels	27.00 to 27.50
Low phos. billet crops	27.00 to 27.50
Low phos. punchings	27.00 to 27.50
Low phos. heavy plate	25.00 to 26.00
Railroad malleable	25.50 to 26.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$20.50 to \$21.00
No. 2 hvy. mltng. steel	19.50 to 20.00
Hydraulic bund., new	20.50 to 21.00
Hydraulic bund., old	17.50 to 18.00
Steel rails for rolling	25.00 to 26.00
Cast iron carwheels	23.00 to 23.50
Hvy. breakable cast.	17.50 to 18.00
No. 1 cupola cast.	23.00 to 23.50
Mixed yard (f'd'y) cast	19.50 to 20.00
Stove plate (steel wks.)	18.50 to 19.00
Railroad malleable	22.50 to 23.00
Machine shop turn.	14.50 to 15.00
No. 1 blast furnace	13.00 to 13.50
Cast borings	15.00 to 15.50
Heavy axle turnings	19.00 to 19.50
No. 1 low phos. hvy.	25.50 to 26.00
Couplers & knuckles	25.50 to 26.00
Roller steel wheels	25.50 to 26.00
Steel axles	25.00 to 25.50
Shafting	25.50 to 26.00
Spec. iron & steel pipe	18.00 to 18.50
Cast borings (chem.)	15.00

CHICAGO

Delivered to Chicago district consumers:

Per Gross Ton	
Hvy. mltng. steel	\$20.00 to \$20.50
Auto. hvy. mltng. steel	
alloy free	19.00 to 19.50
No. 2 auto steel	16.50 to 17.00
Shoveling steel	20.00 to 20.50
Factory bundles	19.50 to 20.00
Dealers' bundles	18.00 to 18.50
No. 1 busheling	19.00 to 19.50
No. 2 busheling, old	11.50 to 12.00
Roller carwheels	23.50 to 24.00
Railroad tires, cut	23.00 to 23.50
Railroad leaf springs	23.00 to 23.50
Steel coup. & knuckles	23.00 to 23.50
Axle turnings	19.25 to 19.75
Coil springs	24.50 to 25.00
Axle turn. (elec.)	19.75 to 20.00
Los phos. punchings	23.00 to 23.50
Low phos. plates 12 in. and under	22.75 to 23.25
Cast iron borings	13.50 to 14.00
Short shov. turn.	14.00 to 14.50
Machine shop turn.	14.50 to 15.00
Reroiling rails	24.00 to 24.50
Steel rails under 3 ft.	23.00 to 23.50
Steel rails under 2 ft.	23.75 to 24.25
Angle bars steel	22.75 to 23.25
Cast iron carwheels	20.75 to 21.25
Railroad malleable	23.50 to 24.00
Agric. malleable	17.50 to 18.00

Per Net Ton

Iron car axles	\$24.50 to \$25.00
Steel car axles	24.00 to 24.50
Locomotive tires	18.00 to 18.50
Pipes and flues	14.00 to 14.50
No. 1 machinery cast.	17.75 to 18.25
Clean auto blocks	18.00 to 18.50
No. 1 railroad cast.	17.50 to 18.00
No. 1 agric. cast.	16.00 to 16.50
Stove plate	13.00 to 13.50
Grate bars	14.00 to 14.50
Brake shoes	14.25 to 14.75

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$21.50 to \$22.00
No. 2 hvy. mltng. steel	20.00 to 20.50
Low phos. plate	24.00 to 24.50
No. 1 busheling	20.75 to 21.25
Hydraulic bundles	21.00 to 21.50
Machine shop turn.	14.00 to 14.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$20.50 to \$21.00
No. 2 hvy. mltng. steel	19.50 to 20.00

Comp. sheet steel	\$20.00 to \$20.50
Light bund. stampings	16.50 to 17.00
Drop forge flashings	19.25 to 19.75
Machine shop turn.	13.00 to 13.50
Short shov. turn.	13.50 to 14.00
No. 1 busheling	19.75 to 20.25
Steel axle turnings	20.00 to 20.50
Low phos. billet and bloom crops	25.00 to 25.50
Cast iron borings	14.50 to 15.00
Mixed bor. & turn.	14.50 to 15.00
No. 2 busheling	14.50 to 15.00
No. 1 cupola cast.	22.50 to 23.00
Railroad grate bars	15.50 to 16.00
Stove plate	15.50 to 16.00
Rails under 3 ft.	25.50 to 26.00
Rails for rolling	25.00 to 25.50
Railroad malleable	24.50 to 25.00

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	\$21.50 to \$22.00
No. 2 hvy. mltng. steel	19.50 to 20.00
Scrap rails	22.50 to 23.00
New hvy. b'ndled sheets	19.50 to 20.00
Old hydraul. bundles	18.00 to 18.50
Drop forge flashings	19.50 to 20.00
No. 1 busheling	19.50 to 20.00
Machine shop turn.	14.00 to 14.50
Shov. turnings	15.00 to 15.50
Mixed bor. & turn.	14.00 to 14.50
Cast iron borings	14.00 to 14.50
Knuckles & couplers	25.00 to 25.50
Coil & leaf springs	25.00 to 25.50
Roller steel wheels	25.00 to 25.50
No. 1 machinery cast.	20.50 to 21.00
No. 1 cupola cast.	19.00 to 19.50
Stove plate	17.00 to 17.50
Steel rails under 3 ft.	25.50 to 26.00
Cast iron carwheels	18.50 to 19.00
Railroad malleable	24.00 to 24.50
Low phos. plate	26.00 to 27.00

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	\$17.25 to \$17.75
No. 1 hvy. melting	17.50 to 18.00
No. 2 hvy. melting	16.25 to 16.75
No. 1 locomotive tires	21.00 to 21.50
Misc. stand. sec. rails	21.25 to 21.75
Railroad springs	22.75 to 23.25
Bundled sheets	13.50 to 14.00
Cast bor. & turn.	10.00 to 10.50
Machine shop turn.	11.00 to 11.50
Heavy turnings	13.25 to 13.75
Rails for re-rolling	23.50 to 24.00
Steel car axles	24.25 to 24.75
No. 1 RR. wrought	14.50 to 15.00
No. 2 RR. wrought	16.50 to 17.00
Steel rails under 3 ft.	23.75 to 24.25
Steel angle bars	21.50 to 22.00
Cast iron carwheels	21.00 to 21.50
No. 1 machinery cast.	20.00 to 20.50
Railroad malleable	20.50 to 21.00
Breakable cast	17.75 to 18.25
Stove plate	14.50 to 15.00
Grate bars	13.50 to 14.00
Brake shoes	14.50 to 15.00

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel	\$17.75 to \$18.25
No. 2 hvy. mltng. steel	16.25 to 16.75
Scrap rails for mltng.	22.75 to 23.25
Loose sheet clippings	12.50 to 13.00
Hyd'lic bundled sheets	16.50 to 17.00
Cast iron borings	8.75 to 9.25
Machine shop turn.	9.75 to 10.25
No. 1 busheling	13.00 to 13.50
No. 2 busheling	7.50 to 8.00
Rails for rolling	24.25 to 24.75
No. 1 locomotive tires	19.50 to 20.00
Short rails	24.75 to 25.25
Cast iron carwheels	18.75 to 19.25
No. 1 machinery cast.	21.25 to 21.75
No. 1 railroad cast.	19.75 to 20.25
Burnt cast	13.25 to 13.75
Stove plate	13.25 to 13.75
Agricul. malleable	17.75 to 18.25
Railroad malleable	20.75 to 21.25
Mixed hvy. cast.	18.50 to 19.00

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting steel	\$18.00
No. 2 hvy. melting steel	17.00
No. 1 busheling	16.00
Scrap steel rails	17.00
Steel rails under 3 ft.	19.50
Rails for rolling	20.00
Long turnings	7.50
Cast iron borings	8.50
Stove plate	12.00
Steel axles	18.00
No. 1 RR. wrought	16.00
No. 1 cast	18.00
No. 2 cast	13.00
Cast iron carwheels	20.00
Steel carwheels	18.00

DETROIT

Dealers' buying prices per gross ton, f.o.b. cars:

No. 1 heavy melting	\$16.00 to \$16.50
No. 2 heavy melting	15.00 to 15.50
Borings and turnings	11.50 to 12.00
Machine shop turnings	11.00 to 11.50
Long turnings	9.50 to 10.00
Short shov. turnings	12.00 to 12.50
No. 1 cast	18.50 to 19.00
Automotive cast	18.50 to 19.00
Hvy. breakable cast.	14.50 to 15.00
Stove plate	12.00 to 12.50
Hydraul. comp. sheets	18.00 to 18.50
New busheling	16.50 to 17.00
Sheet clips	13.75 to 14.25
Flashings	16.00 to 16.50
Low phos. plate	19.50 to 20.00

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	\$16.00 to \$16.50
No. 2 hvy. mltng. steel	15.00 to 15.50
Hvy. breakable cast.	17.00 to 17.50
No. 1 machinery cast.	18.50 to 19.00
No. 2 cast	15.50 to 16.00
Stove plate	13.50 to 14.00
Steel car axles	20.00 to 21.00
Shafting	20.00 to 20.50
No. 1 RR. wrought	15.50 to 16.00
No. 1 wrought long	14.50 to 15.00
Spec. iron & steel pipe	13.00 to 13.50
Rails for rolling	20.00 to 20.50
Clean steel turnings	10.00 to 10.50
Cast borings*	10.00 to 10.50
No. 1 blast furnace	9.00 to 9.50
Cast borings (chem.)	11.00 to 11.50
Unprepared yard scrap	8.50 to 9.00
Light iron	6.50 to 7.00

Per gross ton delivered local foundries:
No. 1 machin. cast. \$19.00 to \$19.50
No. 2 cast 16.50 to 17.00

* \$1.50 less for truck loads.

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars:

Breakable cast	\$15.75 to \$16.00
Machine shop turn.	9.25 to 9.50
Mixed bor. & turn.	8.25 to 8.50
Run. skeleton long	12.50 to 12.75
Shafting	19.65 to 19.75
Stove plate	12.75 to 13.00
Cast bor. chemical	9.50 to 9.75

Per gross ton delivered consumers' yards:
Textile cast \$20.00 to \$21.00
No. 1 machine cast 20.00 to 20.75

Per gross ton delivered dealers' yards:
No. 1 hvy. mltng. steel \$15.75 to \$16.00
No. 2 steel 14.75 to 15.50

PACIFIC COAST

Per net ton delivered to consumer:

	San Fran.	Los Ang.	Seattle
No. 1 hvy. mltng. steel	\$14.25	\$13.25	\$15.00
No. 2 hvy. mltng. steel		12.00	
Bundles		10.00	

CANADA

Dealers' buying prices at these yards, per gross ton:

	Toronto	Montreal
Low phos. steel	\$13.00	\$12.50
No. 1 hvy. mltng. steel	11.25	10.75
No. 2 hvy. mltng. steel	10.00	9.75
Mixed dealers steel	8.75	8.25
Drop forge flashings	9.75	9.25
New loose clippings	8.75	8.25
Busheling	6.00	5.50
Scrap pipe	7.75	7.25
Steel turnings	7.50	7.00
Cast borings	7.50	7.00
Machinery cast	20.00	19.00
Dealers' cast	19.00	18.00
Stove plate	15.75	15.25

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered barges	
No. 1 hvy. mltng. steel	\$16.00
No. 2 hvy. mltng. steel	15.00
No. 2 cast	\$15.00 to 15.50
Stove plate	14.00

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel	\$16.00
No. 2 hvy. mltng. steel	\$15.00 to 15.50
Rail (scrap)	16.00 to 16.25

Philadelphia, delivered alongside boats, Port Richmond

No. 1 hvy. mltng. steel	Nominal
No. 2 hvy. mltng. steel	Nominal

Construction Steel

...STRUCTURAL STEEL, REINFORCING BARS, PLATES, PILING, ETC.

Fabricated Steel

Awards advance to 25,700 tons from 22,725 tons last week; new projects drop to 36,225 tons from 41,910 tons a week ago; plate lettings total 4875 tons.

AWARDS

NORTH ATLANTIC STATES

- 1800 Tons, Bayway, N. J., and Baton Rouge, La., two cracking towers for Standard Oil Co. of New Jersey, to American Bridge Co., Pittsburgh.
- 1700 Tons, Boston Navy Yard, shop building, to American Bridge Co., Pittsburgh, through Sawyer Construction Co., Boston, contractor.
- 1650 Tons, Camden, N. J., turret shop for New York Shipbuilding Corp., to Bethlehem Steel Co., Bethlehem, Pa.
- 460 Tons, Philadelphia, addition for S.K.F. Industries, to American Bridge Co., Pittsburgh.
- 350 Tons, Buffalo, factory addition for East Delavan Avenue plant of Houde Engineering Corp., to R. S. McMannus Steel Construction Co., Buffalo.
- 320 Tons, McKean County, Pa., State highway bridge, route 111, to Phoenix Bridge Co., Phoenixville, Pa.
- 290 Tons, Brooklyn, Belt Parkway pedestrian overpass E-6, for Triboro Bridge Authority, to American Bridge Co., Pittsburgh.
- 273 Tons, Hartford, Conn., building for Pratt & Whitney Co., to Bethlehem Steel Co., Bethlehem, Pa., through James Stewart & Co.
- 260 Tons, Hartford, Conn., Colt office building, to Belmont Iron Works, Philadelphia.
- 230 Tons, Macedon, N. Y., grade crossing elimination, to Bethlehem Steel Co., Lackawanna, through Cefoli & Dean, South Wales, N. Y.
- 230 Tons, Wellsville, N. Y., building for Air Preheater Corp., to R. S. McMannus Steel Construction Co., Buffalo.
- 225 Tons, Lycoming County, Pa., State highway bridge, to Lackawanna Steel Construction Co., Buffalo.
- 200 Tons, Wayne County, N. Y., State highway bridge, to Bethlehem Steel Co., Bethlehem, Pa.
- 200 Tons, Globe Mills, Pa., State highway bridge LR-54036, to American Bridge Co., Pittsburgh.
- 190 Tons, New London, Conn., laboratory, to an unnamed fabricator.
- 185 Tons, Delaware County, N. Y., State highway bridge, to Lackawanna Steel Construction Co., Buffalo.
- 163 Tons, New Kensington, Pa., building for Aluminum Co. of America, to Bethlehem Steel Co., Bethlehem, Pa.

THE SOUTH

- 1100 Tons, Sewall's Point, Va., Norfolk & Western warehouse, to Virginia Bridge Co., Roanoke, Va.

- 1000 Tons, San Antonio, Tex., Duncan Field, airplane repair dock, to North Texas Steel & Iron Co., Fort Worth, Tex.
- 900 Tons, Atlanta, Ga., office and warehouse for Westinghouse Electric & Mfg. Co., to Bethlehem Steel Co., Bethlehem, Pa.
- 240 Tons, Charleston, W. Va., post office, to Ingalls Iron Works Co., Birmingham, through T. G. Egan Refractory Engineering Co.

CENTRAL STATES

- 1326 Tons, Ishpeming, Mich., mine shaft sets for Cleveland-Cliffs Iron Co., to Worden-Allen Co., Milwaukee.
- 1200 Tons, Ravenna, Ohio, first 17 out of 250 buildings for ammunition loading plant, to Bethlehem Steel Co., Bethlehem, Pa., through Hunkin-Conkey Construction Co.
- 1100 Tons, Chicago, movable traffic separators for Chicago Park district, to A. J. O'Leary Co., Chicago.
- 890 Tons, Menominee, Wis., State highway letting, to Milwaukee Bridge Co., Milwaukee.
- 800 Tons, Cleveland, factory for Ohio Crankshaft Co., to Burger Iron Co., Akron, Ohio, through Sam W. Emerson Co., Cleveland.
- 800 Tons, Cleveland, building for Westinghouse Electric & Mfg. Co., to Ingalls Iron Works Co., Birmingham.
- 730 Tons, South Bend, Ind., plant for Bendix Aviation Corp., to Austin Co., Cleveland.
- 455 Tons, Columbia Park, Ohio, unit No. 4 Columbia Engineering Corp., to Mount Vernon Bridge Co., Mount Vernon, Ohio.
- 378 Tons, La Salle, Ill., buildings for Westclox Co., to Mississippi Valley Structural Steel Co., St. Louis, through Jopst & Sons.
- 320 Tons, Cleveland, aviation building and stamping plant for Eaton Mfg. Co., to Burger Iron Co., Akron, Ohio, through Cleveland Construction Co.
- 300 Tons, Cincinnati, factory for R. R. LeBlond Machine Tool Co., to L. Schreiber & Sons, Cincinnati.
- 230 Tons, Dearborn, Mich., engine test building, aircraft plant, for Ford Motor Co., to American Bridge Co., Pittsburgh.
- 200 Tons, Belleville, Ill., mess hall, Scott Field, to Duffin Iron Co., Chicago.
- 165 Tons, Galion, Ohio, municipal light plant, to Mansfield Structural Co., Mansfield, Ohio.

WESTERN STATES

- 2000 Tons, Vancouver, Wash., Aluminum Co. of America plant addition, to Bethlehem Steel Co., in addition to tonnage reported Oct. 24.
- 1500 Tons, Wake Island, Pacific Ocean, pier, to Columbia Steel Co., San Francisco, through Raymond Concrete Pile Co., Turner Construction Co., Hawaiian Dredging Co., J. H. Pomeroy Co., and Morrison-Knudsen Co., Alameda, Cal., joint contractors.
- 338 Tons, Bakersfield, Cal., highway bridges, to Bethlehem Steel Co., Los Angeles, through A. Teichert & Son, Inc., Sacramento, Cal., contractor.

- 259 Tons, Arcadia, Cal., undercrossing, to Columbia Steel Co., Los Angeles, through J. E. Haddock, Ltd., Pasadena, Cal., contractor.
- 238 Tons, Gilroy, Cal., Pajaro River bridge, to Judson-Pacific Co., San Francisco, through C. W. Caletti & Co., San Rafael, Cal., contractors.
- 200 Tons, Vernon, Cal., Ducommun Metals & Supply Co. warehouse and office addition, to Consolidated Steel Corp., Los Angeles.
- 152 Tons, Sunol, Cal., Silver Springs undercrossing, to Judson-Pacific Co., San Francisco, through Earl Heple, San Jose, Cal., contractor.
- 140 Tons, Nacimiento, Cal., Southern Pacific bridge, to Columbia Steel Co., San Francisco.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

- 18,000 Tons, War Department, Washington, 72 Air Corps hangars in various locations; bids Dec. 2.
- 5000 Tons, Brooklyn, elevated parkway, contracts B-13 and B-15 for Triborough Bridge Authority.
- 1625 Tons, Pittsfield, Mass., General Electric Co.; 1200 tons for plant; 300 tons for mill building, and 125 tons for crane runway.
- 1100 Tons, Deer Park, Long Island, State hospital buildings No. 3 and 4.
- 1050 Tons, Brooklyn, Hamilton Avenue bridge over Gowanus Canal.
- 650 Tons, Baltimore, store building addition for May Co.
- 600 Tons, Niagara Falls, N. Y., unnamed project (previously reported at 250 tons); bids in.
- 450 Tons, New York, reconstruction, north footwalk, Williamsburg bridge.
- 350 Tons, Fort Mifflin, Pa., marine terminal for Atlantic Refining Co.
- 325 Tons, Philadelphia, ammunition research laboratory and range for Government.
- 300 Tons, Frederick, Md., temporary hangar, municipal airport, for Army.
- 300 Tons, Indiantown Gap, Pa., hangar and boiler houses, for Government.
- 275 Tons, Corry, Pa., factory building for Aero Supply Mfg. Co.
- 250 Tons, Baltimore, store building and bowling alleys for Franklin Realty Co.
- 225 Tons, Newark, N. J., warehouse and office building for Galsworthy, Inc.
- 190 Tons, Bellevue, Pa., building for Bell Telephone Co.
- 190 Tons, New Jersey highway bridge, route 29, section 2 E.
- 110 Tons, Eddystone, Pa., girders for Baldwin Locomotive Works.
- Unstated tonnage, Buffalo Airport, hangar for American Airlines, Inc.

CENTRAL STATES

- 1200 Tons, Minneapolis, building for Farmers & Mechanics Savings Bank.
- 1100 Tons, Cincinnati, bakery and office building for Streitman Bakery Co.
- 350 Tons, Cleveland, warehouse for West-

Weekly Bookings of Construction Steel

Week Ended	Nov. 26, 1940	Nov. 19, 1940	Oct. 29, 1940	Nov. 28, 1939	Year to Date	
					1940	1939
Fabricated structural steel awards	25,700	22,725	39,925	25,770	1,059,835	867,495
Fabricated plate awards	4,875	2,600	2,360	2,310	140,475	142,390
Steel sheet piling awards	200	0	1,435	0	65,380	75,365
Reinforcing bar awards	12,850	11,860	8,950	2,380	436,895	426,220
Total Letting of Construction Steel	43,625	37,185	52,670	30,460	1,702,585	1,511,470

- inghouse Electric & Mfg. Co.
 240 Tons, Pontiac, Mich., final repair shop for Yellow Truck & Coach Mfg. Co.
 200 Tons, Portage County, Ohio, State bridge.
 140 Tons, Franklin County, Ohio, Big Walnut Creek State bridge.
 120 Tons, Manitowoc, Wis., warehouse addition for Aluminum Goods Mfg. Co.
 100 Tons, Cleveland, building for General Electric Co.

WESTERN STATES

- 1500 Tons, Mare Island Navy Yard, Cal., electric shop, steam test plant and sub-assembly facilities to building 382 (Specification 10,221); bids Dec. 11.
 300 Tons, Oakland, Cal., transit shed, garage, firehouse and public works shops for Navy (Specification 10,111); bids taken.
 183 Tons, Bremerton, Wash., Navy Requisition NSA 641, Schedule 2590; bids in.

FABRICATED PLATES

AWARDS

- 1400 Tons, Seattle, Richfield Oil Co. tanks, to Chicago Bridge & Iron Co., San Francisco.
 1000 Tons, Pacific Coast, Navy mooring buoys (Schedule 3422), to Southwest Welding & Mfg. Co., Alhambra, Cal.
 1000 Tons, Oleum, Cal., oil tanks, to Chicago Bridge & Iron Co., San Francisco.
 300 Tons, Baytown and Ingleside, Tex., welded tanks for Humble Oil & Refining Co., to Chicago Bridge & Iron Co., Chicago.
 175 Tons, Detroit, steel pipe for Ford Motor Co., to Bethlehem Steel Co., Bethlehem, Pa.

SHEET PILING

AWARDS

- 200 Tons, Park Falls, Wis., bulkhead, Flambeau Paper Co., to L. B. Foster Co., Pittsburgh, Pa., through C. R. Meyer & Son, contractor.

Reinforcing Steel

Awards of 12,850 tons; 4700 tons in new projects

AWARDS

ATLANTIC STATES

- 511 Tons, Clifton, N. Y., route No. 6, sections 8-A and 8-B, to Stultz-Sickles Co., Newark, N. J., through La Fera Crecco Contracting Co.
 300 Tons, Pawtucket, R. I., housing project, to Truscon Steel Co., Boston, through Chain Construction Corp., New York, contractor.
 260 Tons, Washington, Federal Works Agency office building, to Sweets Steel Co., through McCloskey & Co.
 208 Tons, Schenectady Co., N. Y., State project PSC-4775, to Truscon Steel Co., Youngstown, through Fred Berlant & Sons.
 125 Tons, Troy, N. Y., Behr Manning Corp. factory, to Bethlehem Steel Co., Bethlehem, Pa., through Morton C. Tuttle Co., contractor.
 110 Tons, Trenton, N. J., building for American Radiator & Standard Sanitary Corp., to Truscon Steel Co., Youngstown, through Karno-Smith Co., Philadelphia, general contractor.
 100 Tons, McKean Co., Pa., route 10, section 2, to Truscon Steel Co., Youngstown, through M. Bennett & Sons.

SOUTH AND CENTRAL

- 1000 Tons, Yorktown, Va., Navy housing and ammunition facilities, to Bethlehem Steel Co., Bethlehem, Pa., through Hall-Hodges Co., Virginia Engineering Co. and Wise Construction Co., contractors.
 500 Tons, Marion, Ill., Veterans' Hospital, to Laclede Steel Co., St. Louis, through Ring Construction Co., Minneapolis, general contractor.
 465 Tons, Chicago, subway No. S-9-B, to Republic Steel Co., Cleveland.
 340 Tons, Roanoke, Va., Norfolk & Western Railway yard improvements, to Bethlehem Steel Co., Bethlehem, Pa., through Virginia Steel Co.; M. S. Hudgins, contractor.
 200 Tons, Minneapolis, Minn., factory building for Northern Pump Co., to Truscon Steel Co., Youngstown.
 150 Tons, Milwaukee, Marquette University engineering building, to Youngstown Sheet & Tube Co., Youngstown.

- 125 Tons, Worth County, Iowa, State highway project, to Laclede Steel Co., St. Louis.
 120 Tons, Chillicothe, Ohio, water plant, to Truscon Steel Co., Youngstown, through J. W. Harper.

WESTERN STATES

- 1430 Tons, San Francisco, United States Engineer, Invitation 868-41-86, to Pacific States Steel Corp., San Francisco.
 545 Tons, Ogden, Utah, 32 Army warehouses (Invitation QM-6585-41-300 (OOD)), to Colorado Builders Supply Co., Denver.
 300 Tons, Seattle, Naval Reserve armory, to Truscon Steel Co., Seattle.
 169 Tons, Gilroy, Cal., Pajaro River bridge, to Gilmore Fabricators, Inc., San Francisco, through C. W. Caletti & Co., San Rafael, Cal.
 111 Tons, The Dalles, Ore., high school, to Truscon Steel Co., Youngstown, through Malarkey & Kallander.

CANAL ZONE

- 2900 Tons, Panama Canal, schedule No. 4506, to Bethlehem Steel Co., Bethlehem, Pa., through Joseph T. Ryerson & Sons.
 2150 Tons, Panama Canal, sector hospital and nurses' quarters, Fort Clayton, Balboa and Fort Gulick, Cristobal, to Carnegie-Illinois Steel Corp., Pittsburgh, McDonald Construction Co. and Tarlton Construction Co., St. Louis, contractors.
 710 Tons, Panama Canal, Army hangars and miscellaneous buildings, to Bethlehem Steel Co., Bethlehem, Pa., through N. P. Severin Co., contractor.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

- 1000 Tons, Boston, Heath Street housing project.
 1000 Tons, Queens, N. Y., Bureau of Sewers, contract No. 2; Delhan Construction Co., low bidder.
 640 Tons, Brooklyn, elevated parkway, contracts B-13 and B-15; bids Nov. 29.
 135 Tons, State of New Jersey, highway bridge, route 29, section 2 E.

CENTRAL STATES

- 200 Tons, Macomb County, Mich., Chrysler Corp. buildings; O. W. Burke Co., contractor.
 200 Tons, Cleveland, joist for Sears, Roebuck & Co. warehouse; bids in.
 140 Tons, Hamilton County, Ohio, White Water River Bridge.
 101 Tons, Canton, Ohio, joist for nurses' home; bids in.

WESTERN STATES

- 250 Tons, San Francisco, State psychiatric hospital; Carl N. Swanson Co., San Jose, Cal., low bidder on general contract.
 225 Tons, Fort Tejon, Cal., highway work; bids Dec. 11.
 179 Tons, San Francisco, Navy assembly shop at Hunters Point (Specification 10,172); Barrett & Hilp, San Francisco, low bidders on general contract.

HAWAII

- 260 Tons, Schofield Barracks, T.H., quarter-master barracks (Invitation QM-6812-41-26); bids in.

CANAL ZONE

- 340 Tons, Canal Zone, schedule No. 4566; bids in.

Pipe Lines

Davis & Co., Inc., Commerce Building, Houston, Tex., oil operator, plans pressure pipe line system for natural gas transmission to new gas recycling plant to be built near Agua Dulce, Tex. Also will install compressor station, steel storage tanks and other facilities. Entire project will cost over \$300,000.

City Council, Dumas, Tex., plans pressure pipe line system for natural gas distribution, including main welded steel pipe line for connection with supply source, control station and other facilities. Bond issue of \$60,000 has been authorized.

Bureau of Reclamation, Denver, closes bids Dec. 10 for 4 to 22-in. outside diameter fabricated steel pipe, including fittings, for South Ogden water distribution system, Ogden River project, Utah (Specifications 1458-D).

Magnolia Pipe Line Co., Magnolia Building, Dallas, Tex., has awarded contract to Williams Brothers Corp., National Bank of Tulsa Building, Tulsa, Okla., for new 8-in. pressure pipe line system from Duggan-Slaughter oil field, west Texas, to Seminole, Tex., about 50 miles, for crude oil transmission. Line will have a rated capacity of about 6000 bbl. per day, with booster pumping stations and other operating facilities. New bulk terminal will be built at Seminole, with steel tank capacity of approximately 70,000 bbl.

Village Council, Scott, La., asks bids until Dec. 2 for pressure pipe line system for municipal natural gas distribution, including main welded steel pipe line for connection with supply source, control station and other operating facilities. F. P. Joseph, Glenmora, La., is consulting engineer.

Williams Oil Co., Bradford, Pa., plans pressure pipe lines for crude oil transmission in connection with development of new wells in Music Mountain oil field district, near Lewis Run, McKean County, Pa. Pipe line gathering system will be installed, with bulk oil storage facilities.

Cast Iron Pipe

Midland, Tex., plans 3, 6 and 8-in. pipe for extensions in water system. New source of supply will be developed and pumping station installed, with capacity of about 3000 gal. per min. Cost close to \$50,000. L. A. Rodenhiser is city engineer.

Bessemer Sanitary District, Bessemer, near Greensboro, N. C., plans pipe line extensions in water system. Fund of about \$86,600 is being arranged for this and sewerage system, of which \$25,000 will be a bond issue and remainder secured through Federal aid.

Burlington, Ill., plans pipe lines for water system and other waterworks installation. Cost about \$42,000. Financing has been arranged through Federal aid. Laverne A. Miller, Streator, Ill., is consulting engineer.

Water Department, San Diego, Cal., has plans for extensions in water system, including development of new source of supply, for which a bond issue of \$4,300,000 was authorized at recent election. Of this amount, \$3,000,000 will be used for construction of a dam on San Vicente Creek, about four miles from Lakeside; and \$1,300,000 for pipe lines and auxiliary facilities for distribution, to include 11 new main pipe lines in different districts. Additional filtration equipment will be installed at reservoir in University Heights district.

White, S. D., asks bids until Dec. 3 for about two and one-half miles of 2 to 8-in. pipe for water system; also for other waterworks equipment. Dakota Engineering Co., Mitchell, S. D., is consulting engineer.

Crane, Tex., plans pipe lines for water system and other waterworks installation. Cost about \$125,000. A. W. Hefling, 8 East Second Street, Hutchinson, Kan., is consulting engineer.

Charlotte, N. C., plans new 8-in. pipe from connection with city system to army air base at municipal airport, for main water supply. Bond issue is being arranged, in addition to Federal financing.

Public Utility District No. 1, Cathlamet, Wash., closes bids Dec. 7 for pipe lines for water system, including fittings and accessories; also for 50,000-gal. steel tank on steel tower, and pumping station on Columbia River, with intake. H. L. Gilbert, Couch Building, Portland, is consulting engineer.

Board of Robinson Township Commissioners, Groveton, Pa., plans about 14 miles of 6, 8 and 10-in. cement-lined, centrifugally-cast, cast iron water pipe for system. Cost about \$180,000. Bond issue has been approved. Municipal Engineering Co., 2020 West Liberty Avenue, Pittsburgh, is consulting engineer.

Phoenix, Ariz., has taken bids on 75,000 to 185,000 ft. of 3 to 14-in. pipe, 30 to 130 tons of fittings, 167 to 420 valves, 100 to 350 valve boxes and covers, and 100 to 200 fire hydrants.

Prices of Finished Iron and Steel...

Steel prices on these pages are f.o.b. basing points (in cents per lb.) unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, deductions, and in most cases freight absorbed to meet competition.

Basing Point ↓ Product													DELIVERED TO		
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Phila- delphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.27¢
Cold rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	
Long ternes ²	3.80¢		3.80¢									4.55¢			
Wrought iron	4.75¢														
STRIP															
Hot rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢		
Cold rolled ⁴	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.90¢		
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢								
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.05¢		
TIN PLATE															
Standard cokes (Per 100-lb base box)	\$5.00	\$5.00	\$5.00						\$5.10						
BLACK PLATE															
29 gage ⁵	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ (¹⁰)			
TERNES, M'FG.															
Special coated (Per base box)	\$4.30		\$4.30						\$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.50¢	2.80¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢	2.25¢		
Reinforcing (rail) ⁷	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢	2.05¢				2.40¢	2.45¢	2.15¢		
Cold finished ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢							2.70¢		
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Coatesville and Claymont = 2.10¢)		2.45¢	2.65¢		2.29¢	2.15¢
Wrought iron	3.80¢														
Floor plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)										
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem = 2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢				(Worcester = 3.00¢)							
0.51 to 0.75 Carbon	4.30¢			4.30¢				(Worcester = 4.50¢)							
0.76 to 1.00 Carbon	6.15¢			6.15¢				(Worcester = 6.35¢)							
1.01 to 1.25 Carbon	8.35¢			8.35¢				(Worcester = 8.55¢)							
WIRE⁹															
Bright	2.60¢	2.60¢		2.60¢	2.60¢			(Worcester = 2.70¢)							
Galvanized	2.60¢	2.60¢		2.60¢	2.60¢			(Worcester = 2.70¢)							
Spring	3.20¢	3.20¢		3.20¢				(Worcester = 3.30¢)							
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			
IRON BARS															
Common		2.25¢			(Terre Haute, Ind. = 2.15¢)										
Refined	3.75¢														
Wrought	4.40¢														

¹ Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. ² Unassorted 8-lb. coating. ³ Widths up to 12 in. ⁴ Carbon 0.25 per cent and less. ⁵ Applies to 29 gage within certain width and length limitations. ⁶ For merchant trade. ⁷ Straight lengths as quoted by distributors. ⁸ Also shafting. For quantities of 20,000 to 39,999 lb. ⁹ Carload lots to manufacturing trade. ¹⁰ Boxed.

PRICES

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are \$2 higher f.o.b. Duluth, billets only, \$2 higher.

	Per Gross Ton
Rerolling	\$34.00
Forging quality	40.00

Shell Steel

Basic open hearth shell steel f.o.b. Pittsburgh and Chicago.

	Per Gross Ton
3 in. to 12 in.	\$52.00
12 in. to 18 in.	54.00
18 in. and over.	56.00

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting to length, or quantity. This type of steel is for hot rolled sections used for the forging of shells and includes rounds, round squares, and special sections.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer.	\$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared.	1.90c.

Wire Rods

	(No. 5 to 9/32 in.)	Per Lb.
Pittsburgh, Chicago, Cleveland.		2.00c.
Worcester, Mass.		2.10c.
Birmingham		2.00c.
San Francisco		2.50c.
Galveston		2.25c.
9/32 in. to 4/64 in., \$3 a net ton higher. Quantity extras apply.		

ROOFING TERNE PLATE

	(F.o.b. Pittsburgh; Package, 112 Sheets) 20x14 in. 20x28 in.	
8-lb. coating I.C.	\$6.00	\$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00
25-lb. coating I.C.	8.00	16.00
30-lb. coating I.C.	8.63	17.25
40-lb. coating I.C.	9.75	19.50

WIRE PRODUCTS

(To the Trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham)

	Base per Keg	
Standard wire nails	\$2.55	
Coated nails	2.55	
Cut nails, carloads	3.85	
	Base per 100 Lb.	
Annealed fence wire	\$3.05	
	Base Column	
Woven wire fence*	67	
Fence posts (carloads)	69	
Single loop bale ties	56	
Galvanized barbed wire†	70	
Twisted barbless wire	70	

*15½ gage and heavier. †On 80-rod spools in carload quantities.
Note: Birmingham base same on above items, except spring wire.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine and carriage bolts:	
½ in. and smaller by 6 in. and shorter	68
9/16 and 5/8 in. by 6 in. and shorter	66
¾ to 1 in. by 6 in. and shorter	64
1½ in. and larger, all lengths	62
All diameters over 6 in. long	62
Lag, all sizes	65

Plow bolts	68½
Hot pressed nuts; c.p.c., t-nuts; square, hex., blank or tapped:	
½ in. and smaller	66
9/16 to 1 in. inclusive	63
1½ in. to 1½ inclusive	61
1½ in. and larger	60

On above items, excepting plow bolts, additional allowance of 10 per cent for full container quantities.

On all of the above items there is an additional 5 per cent allowance for carload shipments.

	Semi-fin.	hexagon nuts	U.S.S.	S.A.E.
½ in. and smaller.	66		70	
9/16 to 1 in.	63		65	
1½ in. through 1½ in.	61		62	
1½ in. and larger.	60			

In full container lots, 10 per cent additional discount.

Stove bolts, packages, nuts loose	72½ and 10
Stove bolts in packages, with nuts attached	72½
Stove bolts in bulk	82

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York, lots of 200 lb. or over.

Large Rivets

(½ in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	\$3.40

Small Rivets

(7/16 in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 10

Cap and Set Screws

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller ...	50 and 10
Milled headless set screws, cut thread ¼ in. and larger	64
3/16 in. and smaller	73
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	70
Upset set screws, cup and oval points	75
Milled studs	52

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Nov. 20	Nov. 22	Nov. 23	Nov. 25	Nov. 26
Copper, Electrolytic¹	12.00	12.00	12.00	12.00	12.00
Copper Lake	12.00	12.00	12.00	12.00	12.00
Tin, Straits, New York	50.25	50.375		50.25	50.375
Zinc, East St. Louis²	7.25	7.25	7.25	7.25	7.25
Lead, St. Louis³	5.65	5.65	5.65	5.65	5.65

¹ Mine producers' quotations only, delivered Conn. Valley. Deduct ¼ c. for approximate New York delivery price. ² Add 0.39c. for New York delivery. ³ Add 0.15c. for New York delivery.

Warehouse Products

Cents per lb., Delivered

	New York	Cleveland
Tin		
Straits pig	51.50	54.50
Copper		
Electro	12.75	13.50
Castings	12.50	13.00
H. R. Sheets*	20.12	20.12
Seamless tubes*	20.62	20.62
Brass		
Yellow sheets*	18.65	18.65
Yellow, rods*	13.67	13.67
Seamless tubes*	21.40	21.40
Zinc		
Slabs	8.50	8.10
Sheets, No. 9 casks	12.50	14.00
Lead		
American pig	6.75	6.25
Bar	8.45	8.90
Cut sheets	8.80	9.15

Antimony		
Asiatic	16.00	17.00
Aluminum		
Virgin, 99%	20.00	21.00
No. 1 remelt., 98-99%	18.00	18.50
Solder		
½ and ½	31.00	32.25
Babbitt		
Anti-friction grade ..	23.50	21.75

Old Metals

Cents per lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their use.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper		
Hvy. crucible	10.00	10.625
Hvy. and wire	9.00	9.40
Light and bottoms ..	8.00	8.50
Brass		
Heavy	5.750	6.255
Light	4.750	5.50
No. 1 yel. turn.	5.50	6.50
No. 1 red or compo. turnings	8.75	9.25
Hvy. Mach. compo. ..	9.125	9.50
Lead		
Heavy	4.75	5.25
Aluminum		
Cast	10.00	11.00
Sheet	13.00	14.00
Zinc	4.750	5.00

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 cents plus, 17c.-18c. a lb.; No. 12 remelt No. 2, standard, 15-15.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt: Asiatic, 16.50c. a lb., New York; American, 13c. a lb., f.o.b. smelter. QUICKSILVER, \$168-\$170 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

*These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33¼; on brass sheets and rods, 40; on brass tubes, 33¼, and copper tubes, 40.

PRICES

ALLOY STEEL

Alloy Steel Blooms, Billets and Slabs

Base per gross ton, f.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem.....\$54.00

Alloy Steel Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade 2.70c.

Delivered, Detroit 2.80c.

S.A.E. Series Numbers Alloy Differential, per 100 Lb.
2000 (1.5 Ni)\$0.35

2100 (1.5 Ni)	0.75
2300 (3.5 Ni)	1.70
2500 (5 Ni)	2.55
3100 Ni-Cr	0.70
3200 Ni-Cr	1.35
3300 Ni-Cr	3.80
3400 Ni-Cr	3.20
4100 Cr-Mo (0.15 to 0.25 Mo.) ..	0.55
4100 Cr-Mo (0.25 to 0.40 Mo.) ..	0.75
x4340 Cr-Ni-Mo	1.70
4340 Cr-Ni-Mo	1.85
4600 Ni-Mo (0.2-0.3 Mo, 1.5-2 Ni)	1.20
5100 (0.60-0.90 Cr)	0.35
5100 (0.80-1.10 Cr)	0.45
5100 Cr spring steel	0.15
52-100 Cr. (electric furnace)...	2.60
6100 Cr-V bar	1.20

6100 Cr-V spring steel	0.85
C-V	0.85

The above differentials are for hot rolled finished products. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

Base per pound, f.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.35c. Delivered Detroit, 3.45c., carlots.

Alloy Steel Plates

Base per lb., f.o.b. Pittsburgh, Chicago and Coatesville.
Open hearth grade3.50c.

STAINLESS AND HEAT-RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chromium-Nickel

No.	304	302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium

No.	410	430	442	446
Bars ...	18.50c.	19.00c.	22.50c.	27.50c.
Plates ..	21.50c.	22.00c.	25.50c.	30.50c.
Sheets ..	26.50c.	29.00c.	32.50c.	36.50c.
H'tstrip ..	17.00c.	17.50c.	24.00c.	35.00c.
C'd st.	22.00c.	22.50c.	32.00c.	52.00c.

TOOL STEEL

(F.o.b. Pittsburgh)

	Base per Lb.
High speed	67c.
High-carbon-chromium	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

ELECTRICAL SHEETS

(F.o.b. Pittsburgh)

	Base per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

Silicon strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb.

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago..	\$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham..	46.00
6-in. and larger f.o.b. dock, San Francisco or Los Angeles or Seattle	56.00

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is \$45 at Birmingham and \$53.80 delivered Chicago.

Another

ERIE....

Forging A 215 LB. "PROP" HUB...



ERIE HAMMERS are outstanding in the country's first line of defense. . This one is forging a 215 lb. airplane propeller hub for a radial motor. . The material is nitriding steel. . 40 years of experience in design and construction of hammers for the forging industry qualify ERIES for the speedy forging of parts for the machines of preparedness or peace.

Write for your complete composite ERIE catalog today.

ERIE FOUNDRY CO.

ERIE, PENNSYLVANIA, U. S. A.

DETROIT 335 Curtis Bldg.	CHICAGO 349 Washington Blvd	INDIANAPOLIS 135 Pennel Station Bldg
FRANCE Fenwick, S. A.	CANADA John Bertram & Sons Co., Ltd.	ENGLAND Burton, Griffiths & Co., Ltd.

ERIE

ERIE BUILDS Dependable HAMMERS

PRICES

BOILER TUBES

Seamless Steel and Lap Weld Commercial
Boiler Tubes and Locomotive Tubes.
Minimum Wall

(Net base prices per 100 ft., f.o.b. Pitts-
burgh, in carload lots)

	Seamless	Lap Weld
	Cold Drawn	Hot Rolled
1 in. o.d. 13 B.W.G.	\$9.01	\$7.82
1 1/4 in. o.d. 13 B.W.G.	10.67	9.26
1 1/2 in. o.d. 13 B.W.G.	11.70	10.23
1 3/4 in. o.d. 13 B.W.G.	13.42	11.64
2 in. o.d. 13 B.W.G.	15.03	13.04
2 1/4 in. o.d. 13 B.W.G.	16.76	14.54
2 1/2 in. o.d. 12 B.W.G.	18.45	16.01
2 3/4 in. o.d. 12 B.W.G.	20.21	17.54
3 in. o.d. 12 B.W.G.	21.42	18.59
3 1/2 in. o.d. 11 B.W.G.	22.48	19.50
4 in. o.d. 10 B.W.G.	24.62	23.15
4 1/2 in. o.d. 10 B.W.G.	35.20	30.54
5 in. o.d. 9 B.W.G.	43.04	37.35
6 in. o.d. 7 B.W.G.	54.01	46.87
	82.93	71.96

Extras for less carload quantities:

40,000 lb. or ft. over.....	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.....	65%

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District
and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought iron
pipe)

Base Price=\$200 Per Net Ton

Butt Weld

Steel	Black	Galv.
1/8 in.	56	36
1/4 to 3/8 in.	59	43 1/2
1/2 in.	63 1/2	54
3/4 in.	66 1/2	58
1 to 3 in.	68 1/2	60 1/2

Wrought Iron

	Black	Galv.
1/4 and 3/8 in.	+9	+10
1/2 in.	24	6 1/2
3/4 in.	30	13
1 and 1 1/4 in.	34	19
1 1/2 in.	38	21 1/2
2 in.	37 1/2	21

Lap Weld

Steel	Black	Galv.
2 in.	61	52 1/2
2 1/2 and 3 in.	64	55 1/2
3 1/2 to 6 in.	66	57 1/4
7 and 8 in.	65	55 1/2
9 and 10 in.	64 1/2	55
11 and 12 in.	63 1/2	54

Wrought Iron

2 in.	30 1/2	15
2 1/2 to 3 1/2 in.	31 1/2	17 1/2
4 in.	33 1/2	21
4 1/2 to 8 in.	32 1/2	20
9 to 12 in.	28 1/2	15

Butt weld, extra strong, plain ends

Steel	Black	Galv.
1/8 in.	54 1/2	41 1/2
1/4 to 3/8 in.	56 1/2	45 1/2
1/2 in.	61 1/2	53 1/2
3/4 in.	65 1/2	57 1/2
1 to 3 in.	67	60

Wrought Iron

1/4 and 3/8 in.	+10	+43
1/2 in.	25	9
3/4 in.	31	15
1 to 2 in.	38	22 1/2

Lap weld, extra strong, plain ends

Steel	Black	Galv.
2 in.	59	51 1/2
2 1/2 and 3 in.	63	55 1/2
3 1/2 to 6 in.	66 1/2	59

	Black	Galv.
7 and 8 in.	65 1/2	56
9 and 10 in.	64 1/2	55
11 and 12 in.	63 1/2	54

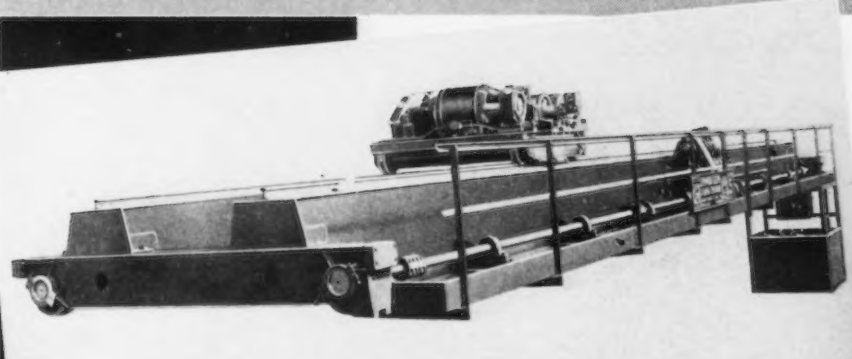
Wrought Iron

2 in.	33 1/2	18 1/2
2 1/2 to 4 in.	39	25 1/2
4 1/2 to 6 in.	37 1/2	24
7 and 8 in.	38 1/2	24 1/2
9 to 12 in.	32	20 1/2

On butt weld and lap weld steel pipe
jobbers are granted a discount of 5%. On
less-than-carload shipments prices are
determined by adding 25 and 30% and the
carload freight rate to the base card.

F.o.b. Gary prices are two points lower
discount or \$4 a ton higher than Pitts-
burgh or Lorain on lap weld and one
point lower discount, or \$2 a ton higher,
on all butt weld 8 in. and smaller.

YOUR NEW OVERHEAD CRANES SHOULD BE "Shaw-Box"!



FEATURES

of the

TYPE "S" CRANE

ALL STEEL "SHAWELD"
CONSTRUCTION

•
ANTI-FRICTION BEARINGS

•
DIRECT BRIDGE DRIVE

•
ROTATING WHEEL AXLES

•
TAPER TREAD WHEELS

•
"SHAWELD" GEARS

•
HYDRAULIC BRIDGE BRAKE

•
ALL PARTS OPERATING
IN OIL BATHS

You Pay No Price Premium
For This Modern Crane

When you buy "Shaw-Box" Cranes you
always buy the most modern cranes there
are . . . You buy cranes that have been
developed to meet today's and tomorrow's
handling problems. You buy leaders! . . .
Today you will find engineering advance-
ments and construction advantages that
first made their appearance on "Shaw-Box"
Cranes on nearly all makes of cranes.

Among the wide variety of "Shaw-Box"
Standard Cranes you will find a type
exactly suited to your needs whether they
be for an electric traveling crane to handle
450 tons or a small hand operated crane
to handle 500 pounds . . . All types are
built up from modern standardized
machinery units produced in large quanti-
ties under mass production methods, there-
fore, you pay no price premium for the
advanced engineering and operating
advantages that you can only get in
"Shaw-Box" Cranes.

Catalogs illustrating all types and con-
taining specifications and dimensions will
be gladly sent free. — Send for them! And,
be sure to have "Shaw-Box" quote on
all your crane and hoist requirements.

SHAW-BOX CRANE & HOIST DIVISION

MANNING, MAXWELL & MOORE, INC.

402 BROADWAY

MUSKEGON, MICHIGAN

PRICES

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, bessemer, 51.50%..	\$4.75
Old range, non-bessemer, 51.50%	4.60
Mesaba, bessemer, 51.50%.....	4.60
Mesaba, non-bessemer, 51.50%..	4.45
High phosphorus, 51.50%.....	4.35

Foreign Ores*

C.A.J. Philadelphia or Baltimore, Exclusive or Duty

Per Unit

Algerian, low P, Cu free, dry, 55 to 58% Fe	Nom.
---	------

Caucasian, washed, 52% Mn.....	Nom.
African, Indian, 44 to 48% Mn....	50c.
African, Indian, 49 to 51% Mn....	54c.
Brazilian, 46 to 48% Mn.....	50c.
Cuban, del'd, duty free, 51% Mn..	68c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	\$23 to \$24
Tungsten, domestic scheelite, delivered	\$23.00
Chrome ore, lump c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	Nom.
Rhodesian, 45%	\$23.50
Rhodesian, 48%	27.50

RAILS, TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., gross ton	\$40.00
Angle bars, 100 lb.....	2.70

F.o.b. Basing Points

Light rails (from billets), gross ton	\$40.00
Light rails (from rail steel), gross ton	39.00

Base per Lb.

Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts, steam railroads...	4.15c.
Track bolts, discount to jobbers all sizes (per 100 counts)...	65-5

Basing points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapqua, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa.; Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond, Va.

FLUORSPAR *Per Net Ton*

Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail....	\$20.00 to \$21.00
Domestic, f.o.b. Ohio River landing barges	20.00 to 21.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines..	20.00 to 21.00
Foreign, 85% calcium fluoride, not over 5% Si., c.i.f. Atlantic ports, duty paid.....	Nominal
Domestic No. 1 ground bulk, 96 to 98%, calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines....	31.00
As above, in bags, f.o.b. same mines	32.60

REFRACTORIES

Fire Clay Brick *Per 1000 f.o.b. Works*

Super-duty brick at St. Louis..	\$60.80
First quality Pennsylvania, Maryland, Kentucky, Missouri and Illinois	47.50
First quality, New Jersey....	52.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	42.75
Second quality, New Jersey....	49.00
No. 1 Ohio	39.90
Ground fire clay, per ton.....	7.10

Silica Brick

Pennsylvania	\$47.50
Chicago District	55.10
Birmingham	47.50
Silica cement, net ton (Eastern)	8.55

Chrome Brick

Net per Ton

Standard f.o.b. Baltimore, Plymouth Meeting and Chester...	\$50.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	50.00

Magnesite Brick

Standard f.o.b. Baltimore and Chester	\$72.00
Chemically Bonded, f.o.b. Baltimore	61.00

Grain Magnesite

Imported, f.o.b. Baltimore and Chester, Pa. (in sacks).....	(—)*
Domestic, f.o.b. Baltimore and Chester in sacks	\$40.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

*None available.



An Assist! By **ATLAS**

View at Prominent Iron Foundry

To Lower Costs!

Here Atlas - designed, Atlas - built equipment moves heavy scrap and other charging materials with consummate ease.

Monorail deposits empty bucket on roller conveyor. Bucket rolls down to scale platform, is charged with iron, weight read from yard crane cab. Scale platform lowers, turns, bucket rolls down to monorail for pick-up and charge to cupola.

A propitious circle, presaging profit at the year-end—and a definitely typical Atlas installation.

THE ATLAS CAR & MFG. CO.

Engineers

CLEVELAND, OHIO

Manufacturers

serving the world with mobile handling equipment

PRICES

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload).....\$120.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%.....\$36.00

Domestic, 26 to 28%..... 49.50

Electric Ferrosilicon

Per Gross Ton, Delivered, Lump Size

50% (carload lots, bulk).....\$74.50*

50% (ton lots, packed)..... 87.00*

75% (carload lots, bulk).....135.00*

75% (ton lots, packed).....151.00*

Bessemer Ferrosilicon

Per Gross Ton, F.o.b. Jackson, Ohio

10.00 to 10.50%.....\$33.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2% \$1 per ton additional.

Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton, F.o.b. Jackson, Ohio

5.00 to 5.50%.....\$27.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots Lump Size, on Contract

4 to 6% carbon.....11.00c.

2% carbon17.50c.

1% carbon18.50c.

0.10% carbon20.50c.

0.06% carbon21.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon\$113.00*

2.50% carbon 118.00*

2% carbon 123.00*

1% carbon 133.00*

Other Ferroalloys

Ferrotungsten, per lb. contained W, del. carload..... \$2.00

Ferrotungsten, 100 lb. and less 2.25

Ferrovanadium, contract, per lb. contained V, del'd \$2.70 to \$2.90†

Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y., ton lots \$2.25†

Ferrocobalt, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace, carload and contract, per net ton.....\$142.50

*Spot prices are \$5 per ton higher.

†Spot prices are 10c. per lb. of contained element higher.

Ferrocobalt, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton.....\$157.50

Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with \$3 unitage, freight equalized with Rockdale, Tenn., per gross ton 58.50

Ferrophosphorus, electrolytic 23-26% in carlots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross tons, \$3 unitage, freight equalized with Nashville 75.00

Ferromolybdenum, per lb. Mo, f.o.b. furnace 95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace 80c.
Molybdenum oxide briquettes 48-52% Mo, per lb. contained Mo, f.o.b. Langeloth, Pa. 80c.

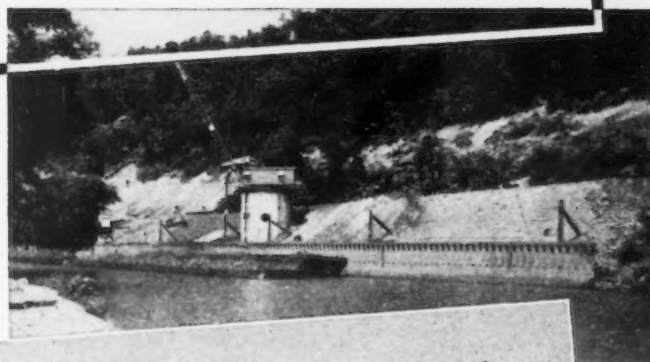
FUEL OIL

No. 3, f.o.b. Bayonne, N. J.4.50c.
No. 6, f.o.b. Bayonne, N. J.2.98c.
No. 5 Bur. Stds., del'd Chicago. 3.25c.
No. 6 Bur. Stds., del'd Chicago. 2.75c.
No. 3 distillate, del'd Cleveland. 5.25c.
No. 4 industrial, del'd Cleveland. 5.00c.
No. 5 industrial, del'd Cleveland. 4.25c.
No. 6 industrial, del'd Cleveland. 3.63c.

5 TONS OF COAL EVERY 32 SECONDS!

FROM SHIP TO SHORE BY

DRAVO



● The Pittsburgh Coal Company's Smith Ferry Dock has ample barge accommodations to insure uninterrupted operation. A Dravo whirler mounted on the shore swings a five ton bucket from ship to shore and back to ship again in 32 seconds, which is moving coal in a hurry; as any dockman will say. A fast, simple, effective rig, it enables the Pittsburgh Coal Company's Smith Ferry Dock to enjoy an unusually low handling cost per ton.

● Whether the problem is one of modernizing old equipment, replacing obsolete handling machines or designing special facilities to meet new problems, consultation with Dravo may prove to be of great value to you. Added to its ability to design, fabricate and erect structures such as shown here, Dravo Corporation has had years of experience building docks, retaining walls, plant foundations—everything that enters into the problems of terminal facilities.

● Bulletin 403 describes docks, mill foundations and terminal equipment. Bulletin 202 describes revolving cranes. Either will be sent upon request. Inquiries relative to specific problems may be addressed to

DRAVO CORPORATION

ENGINEERING WORKS DIVISION

SHIPTARDS: PITTSBURGH, PA.—WILMINGTON, DEL.

GENERAL OFFICES AND SHOPS: NEVILLE ISLAND—PITTSBURGH, PA.

PRICES

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, prompt	\$5.00 to \$5.25
Foundry, f.o.b. Connellsville, prompt	5.50 to 5.75
F'dry, by-product, Chicago.....	10.50
F'dry, by-product, New England	13.00
Foundry, by-product, Newark or Jersey City	\$11.30 to \$11.90
F'dry, by-product, Philadelphia.	11.13
F'dry, by-product, Cleveland...	11.55
F'dry, by-product, Cincinnati...	11.00
Foundry, Birmingham	7.50
F'dry, by-product, St. Louis	
	\$10.75 to \$11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports.....	\$14.75

BRITISH

British

Per Gross Ton, f.o.b. United Kingdom Ports

Ferromanganese, export.£17	18s.
Tin plate, per base box. 32s.	to 33s.
Steel bars, open hearth.£13	9s.
Beams, open hearth....£12	2s. 6d.
Channels, open hearth..£12	2s. 6d.
Angles, open hearth....£12	2s. 6d.
Black sheets, No. 24, gage	
£18 17s. 6d. max.*; £18 17s. 6d. min.**	
Galvanized sheets, No. 24	
gage £19 10s. max.*; £19 10s. min.**	

*Empire markets only.

**Other than Empire markets.

PIG IRON (Per Gross Ton)

Prices delivered various consuming points indicated by bold italics

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phos.
Boston.....	\$24.50	\$24.00	\$25.50	\$25.00	.....
Brooklyn.....	26.50	.....	.....	27.00	.....
Jersey City.....	25.53	25.03	26.53	26.03	.....
Philadelphia.....	24.84	24.34	25.84	25.34	.....
Bethlehem, Pa.....	\$24.00	\$23.50	\$25.00	\$24.50	.....
Everett, Mass.....	24.00	23.50	25.00	24.50	.....
Swedeland, Pa.....	24.00	23.50	25.00	24.50	.....
Steelton, Pa.....	.....	23.50	.....	.....	28.50
Birdsboro, Pa.....	24.00	23.50	25.00	24.50	28.50
Sparrows Point, Md.....	24.00	23.50	.....	.....	.....
Erie, Pa.....	23.00	22.50	24.00	23.50	.....
Neville Island, Pa.....	23.00	22.50	23.50	23.00	.....
Sharpsville, Pa.††.....	23.00	22.50	23.50	23.00	.....
Buffalo.....	23.00	22.00	24.00	23.50	28.50
Cincinnati.....	23.44	23.61	.....	24.11	.....
Canton, Ohio.....	24.39	23.89	24.89	24.39	.....
Mansfield, Ohio.....	24.94	24.44	25.44	24.94	.....
St. Louis.....	23.50	23.02	.....	.....	.....
Chicago.....	23.00	22.50	23.50	23.00	.....
Granite City, Ill.....	23.00	22.50	23.50	23.00	.....
Cleveland.....	23.00	22.50	23.50	23.00	.....
Hamilton, Ohio.....	23.00	22.50	.....	23.00	.....
Toldeo.....	23.00	22.50	23.50	23.00	.....
Youngstown††.....	23.00	22.50	23.50	23.00	.....
Detroit.....	23.00	22.50	23.50	23.00	.....
St. Paul.....	25.63	.....	26.13	25.63	.....
Duluth.....	23.50	.....	24.00	23.50	.....
Birmingham.....	19.38*	18.00	24.00	.....	.....
Los Angeles, San Francisco and Seattle.....	27.50	.....	.....	.....	.....
Provo, Utah.....	22.00	.....	.....	.....	.....
Montreal†.....	27.50	27.50	.....	28.00	.....
Toronto†.....	25.50	25.50	.....	26.00	.....

GRAY FORGE

Valley or Pittsburgh fee.....\$22.50

CHARCOAL

Lake Superior fee.....\$27.00
Delivered Chicago 30.34

Base prices are subject to an additional charge for delivery within the switching limits of the respective districts.

*Delivered prices on Southern iron for shipment to Northern points are 38c. a ton below delivered prices from nearest Northern basing point on iron with phosphorus content of 0.70 per cent and over. †On all grades 2.25 per cent silicon and under is base. For each 25 points of silicon over 2.25 per cent an extra of 25c. is charged.

††On Oct. 25, Pittsburgh Coke & Iron Co. advanced its prices on foundry, malleable and bessemer pig iron \$1.50 a ton and on basic iron \$2 a ton at Sharpsville, Pa., and Youngstown. No change was made by this company in its Neville Island, Pa., quotations.

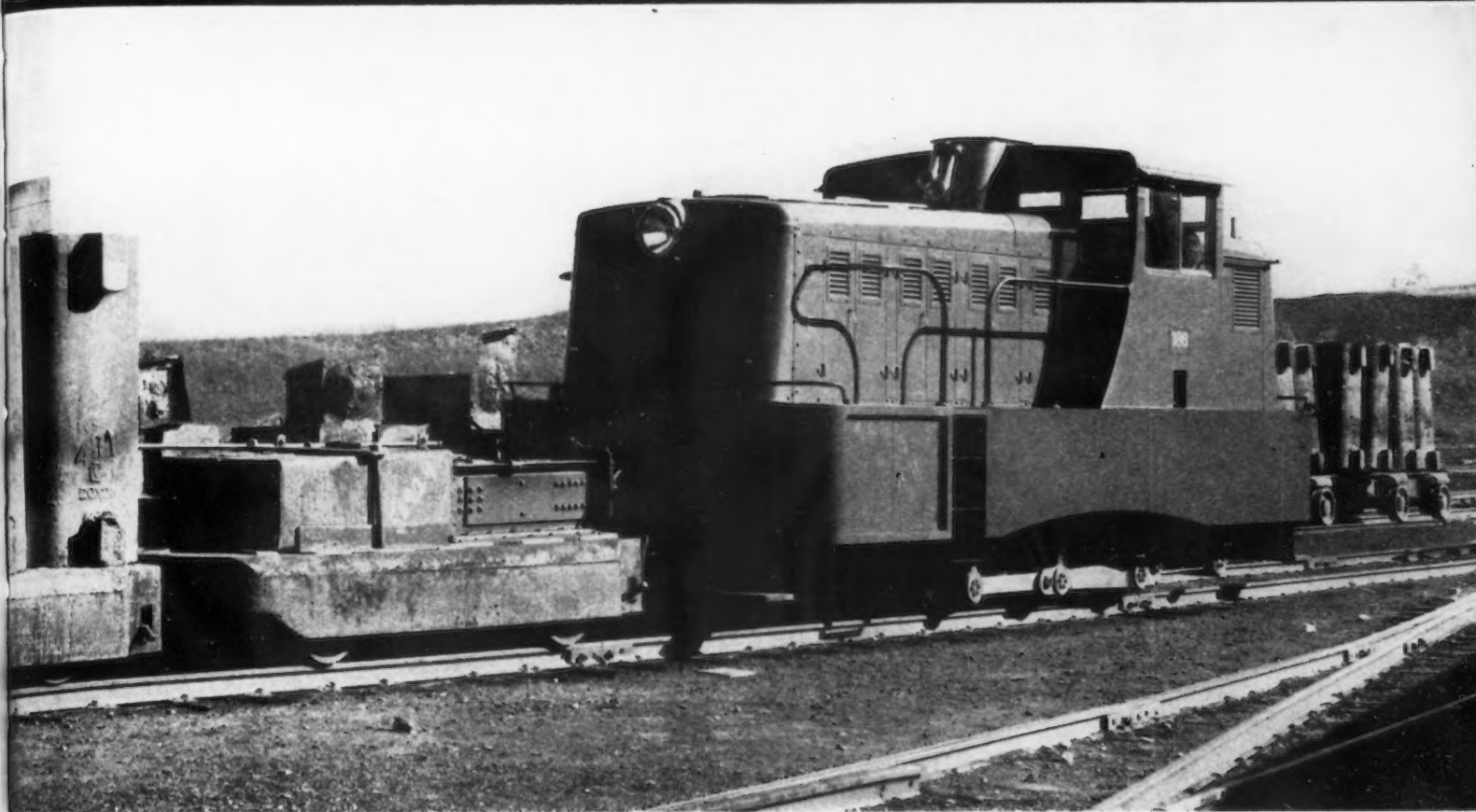
WAREHOUSE PRICES

(Base Prices, Dollars per 100 lb., Delivered Metropolitan Areas)

	Pitts- burgh	Chicago	Cleve- land	Phila- delphia	New York	Detroit	Buffalo	Boston	Birm- ingham	St. Louis	St. Paul	Mil- waukee	Los Angeles
Sheets, hot rolled.....	\$3.15	\$3.05	\$3.15	\$3.35	\$3.38	\$3.23	\$3.05	\$3.51	\$3.45	\$3.18	\$3.30	\$3.48	\$4.30
Sheets, cold rolled.....	.....	4.10	4.05	4.05	4.40	4.30	4.30	4.58	.....	4.12	4.35	4.43	6.50
Sheets, galvanized.....	4.75	4.60	4.42	4.75	4.55	4.64	4.40	4.66	4.75	4.95	4.75	4.98	5.25
Strip, hot rolled.....	3.40	3.40	3.30	3.75	3.76	3.48*	3.62	3.86	3.70	3.52	3.65	3.73	.....
Strip, cold rolled.....	3.20	3.30	3.20	3.31	3.31	3.20	3.22	3.26	.....	3.41	3.83	3.54	.....
Plates.....	3.40	3.55	3.40	3.55	3.76	3.60	3.62	3.85	3.35	3.47	3.80	3.68	4.00
Structural shapes.....	3.40	3.55	3.58	3.55	3.75	3.65	3.40	3.85	3.55	3.47	3.80	3.68	4.00
Bars, hot rolled.....	3.35	3.50	3.25	3.85	3.84	3.43	3.35	3.98	3.50	3.62	3.75	3.63	4.15
Bars, cold finished.....	3.65	3.75	3.75	4.06	4.09	3.80	3.75	4.13	4.43	4.02	4.34	3.88	6.60
Bars, ht. rld. SAE 2300.	7.20	7.10	7.55	7.31	7.35	7.42	7.35	7.50	.....	7.47	7.45	7.33	9.40
Bars, ht. rld. SAE 3100.	5.75	5.65	5.85	5.86	5.90	5.97	5.65	6.05	.....	6.02	6.00	5.88	8.55
Bars, cd. drn. SAE 2300.	8.15	8.15	8.15	8.56	8.59	8.45	8.40	8.63	.....	8.52	8.84	8.38	10.65
Bars, cd. drn. SAE 3100.	6.75	6.75	6.75	7.16	7.19	7.05	6.75	7.23	.....	7.12	7.44	6.98	9.80

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb.; galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: Chicago, galvanized sheets, 500 to 1499 lb.; Philadelphia, galvanized sheets, one to nine bundles, cold rolled sheets, 1000 to 1999 lb.; Detroit, galvanized sheets, 500 to 1499 lb.; Buffalo, cold rolled sheets, 500 to 1500 lb., galvanized sheets, 450 to 1499 lb.; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; Birmingham, hot rolled sheets, strip and bars, plates and shapes, 400 to 3999 lb., galvanized sheets, 500 to 1499 lb.; St. Louis, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 500 to 1499 lb.; Milwaukee, cold rolled sheets, 400 to 1499 lb., galvanized sheets, 150 to 499 lb.; New York, hot rolled sheets, 0 to 1999 lb., cold rolled sheets, 400 to 1499 lb.; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, shapes, cold rolled sheets, 300 to 1999 lb., galvanized sheets, 150 to 1049 lb. Extras for size, quality, etc., apply on above quotations. *12 gage and heavier, \$3.23.

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North Atlantic States

• **United Aircraft Corp.**, East Hartford, Conn., has let general contract to Edwin Moss & Son, Inc., 555 Grant Street, Bridgeport, Conn., for one-story addition, 137 x 290 ft., to Vought-Sikorsky Division, Stratford, Conn., for expansion in engineering and production departments. Cost about \$200,000 with equipment. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

Greenfield Tap & Die Corp., Greenfield, Mass., plans one-story addition, about 40,000 sq. ft. of floor space, for extensions in gage division for Government orders. Cost over \$175,000 with equipment.

Nutmeg Crucible Steel Co., Elm Street, Branford, Conn., steel castings, plans one-story addition for expansion in foundry. Cost over \$45,000 with equipment. Leo F. Caproni, 1221 Chapel Street, New Haven, Conn., is architect and engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 3 for five motor-driven engine lathes (Schedule 4126) for Wickford, R. I., New York, Jacksonville, Fla., Corpus Christi, Tex., and Puget Sound yards; seven similar lathes for Wickford, Jacksonville and Corpus Christi yards (Schedule 4081).

J. L. Lucas & Sons, Inc., Fox Street, Bridgeport, Conn., metal-working machinery and parts, has let general contract to Gellatly Construction Co., 25 Housatonic Avenue, for new plant at Fairfield, Conn., consisting of two one-story structures, 70 x 400 ft., and 50 x 100 ft., for general production, and office and operating service respectively. Cost over \$175,000 with equipment. Leo F. Caproni, 1221 Chapel Street, New Haven, Conn., is architect and engineer.

Bethlehem Steel Co., Shipbuilding Division, Quincy, Mass., has let general contract to Tredennick-Billings Co., 10 High Street, Boston, for one-story addition, 100 x 244 ft., at Fore River shipyard, for storage and distribution. Cost close to \$90,000 with equipment.

Hartford Steel Ball Co., 12 Jefferson Avenue, West Hartford, Conn., steel, aluminum and bronze specialties, will begin superstructure for one-story addition, 82 x 90 ft., for which Louis W. Slocum, 261 North Main Street, is general contractor. Cost close to \$40,000 with equipment. R. J. Percival, 12 Haynes Street, Hartford, is architect.

Standard Oil Co. of New Jersey, Inc., 26 Broadway, New York, has let general contract to Arthur G. McKee & Co., Inc., 2422 Euclid Avenue, Cleveland, for two new furnace units, each 41 x 59 ft., for crude oil pipe stills at Bayway refinery, Linden, N. J. This is part of expansion at plant, comprising several one-story additions, including extensions in laboratory. Entire project will cost over \$125,000 with equipment.

Universal Atlas Cement Co., 135 East Forty-second Street, New York, has approved plans for main two-story unit, 60 x 250 ft., for expansion in production department, and two-story laboratory, 45 x 72 ft., at branch mill, Hudson, N. Y. Cost close to \$100,000 with equipment.

Todd Shipyards Corp., 1 Broadway, New York, has filed plans for one-story compressor plant, 43 x 65 ft., at Brooklyn shipyards. Cost about \$45,000 with compressor units and auxiliary equipment. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

Simmons Co., 230 Park Avenue, New York, bed springs, spring mattresses, etc., plans new works at Linden, N. J., consisting of seven one-story and basement buildings for general

manufacture, assembling, storage and distribution. Cost close to \$325,000 with equipment. Albert A. Kaufmann, 259 North Broad Street, Elizabeth, N. J., is architect.

Curtiss-Wright Corp., 30 Rockefeller Plaza, New York, airplanes and parts, has let general contract to John W. Cowper Co., Inc., Sidway Building, Buffalo, for new plant adjoining Buffalo airport. Cost about \$16,000,000, of which close to \$11,000,000 will be expended for equipment. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

Central New York Power Corp., 300 Erie Boulevard West, Syracuse, N. Y., is arranging fund of about \$8,388,000, through sale of bond and stock issues, for expansion and improvements in power plants, power substations, transmission and distributing lines, and other structures during 1941.

General Electric Co., Schenectady, N. Y., plans one and two-story addition to local plant, 240 x 560 ft., for storage and distribution. Cost about \$500,000 with mechanical-handling and other equipment. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

Fairchild Aviation Corp., 88-06 Van Wyck Boulevard, Jamaica, L. I., airplanes and parts, aircraft engines, etc., is erecting four-story and basement addition, for which general contract recently was let to White Construction Co., 95 Madison Avenue, New York. Cost over \$350,000 with equipment.

Garlock Packing Co., Palmyra, N. Y., mechanical packing for power plants and other use, has let general contract to John B. Pike & Son, Inc., 1 Circle Street, Rochester, N. Y., for one-story addition, 100 x 200 ft. Cost close to \$75,000 with equipment. Carl C. Ade, 52 James Street, Rochester, is architect.

W. C. Lipe, Inc., 208 South Geddes Street, Syracuse, N. Y., gears, clutches and kindred products, is erecting one-story addition, for which Byrne Construction Co., Inc., 411 Roberts Avenue, is general contractor. Cost about \$45,000 with equipment.

Elastic Stop Nut Corp., 1001 Newark Avenue, Elizabeth, N. J., locknuts, etc., has approved plans for one-story addition, 200 x 214 ft., near Vauxhall Road, Union Township, where site recently was acquired. Cost over \$175,000 with equipment.

Commanding Officer, Ordnance Department, Picatinny Arsenal, near Dover, N. J., plans several one-story buildings for expansion in explosives-manufacturing division. Fund of about \$281,000 has been authorized for work.

Campbell Soup Co., Camden, N. J., will begin superstructure soon for multi-story addition for expansion in manufacturing division. Cost close to \$600,000 with equipment. Erection contract has been let to Thomas F. Gibson Co., Commercial Trust Building, Philadelphia.

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., Organic Chemicals Department, has approved plans for expansion in neoprene chemical rubber (artificial rubber) division at plant at Deepwater Point, N. J., to increase capacity by about 500,000 lb. per month. Completion is scheduled late in 1941. Cost over \$3,000,000 with machinery.

Hartley Gauge Corp., East Second and Redington Streets, Lansdale, Pa., pressure gages and kindred equipment, has asked bids on general contract for new one-story plant, 40 x 200 ft. Cost over \$75,000 with equipment.

Kennedy-Van Saun Mfg. & Engineering Corp., Danville, Pa., crushing, grinding and pulverizing machinery and parts, plans one-story addition for expansion in machine and mechanical shop. Cost close to \$50,000 with equipment.

Beth-Uhl Brewing Co., West Union Boulevard, Bethlehem, Pa., has approved plans for

expansion and improvements, including equipment, and will carry out work at once. Cost close to \$100,000 with equipment.

Girard Mfg. Co., Girard, Pa., roller skates, mechanical toys, etc., a subsidiary of Louis Marx & Co., 200 Fifth Avenue, New York, has let general contract to Gillmore-Carmichael-Olson Co., 1873 East Fifty-fifth Street, Cleveland, for one-story addition. Cost over \$150,000 with equipment.

Autocar Co., Ardmore, Pa., motor trucks and parts, is erecting two-story and basement addition, for which general contract recently was let to Turner Construction Co., 420 Lexington Avenue, New York. Cost close to \$125,000 with equipment.

Constructing Quartermaster, Fort Myer, Va., asks bids until Dec. 5 for mechanical equipment for boiler plant and steam distributing system for hospital group at Bolling Field, D. C.

Public Buildings Administration, Federal Works Agency, Washington, plans new steam power plant for central-heating service for various Government buildings. Cost \$3,900,000 with boilers, pumps, distribution lines, etc., of which \$1,500,000 is available at once to begin project.

Fairchild Aircraft Corp., Hagerstown, Md., has let general contract to Price Construction Co., Maryland Trust Building, Baltimore, for two-story addition for expansion in production division. Cost over \$75,000 with equipment. Company is a subsidiary of Fairchild Engine & Airplane Corp., 30 Rockefeller Plaza, New York.

Bureau of Yards and Docks, Navy Department, Washington, has let general contract to W. P. Thurston Co., Richmond, Va., for expansion and improvements in submarine base, Naval Station, Key West, Fla., including mechanical shops, marine railway, oil storage units and other structures and facilities, at cost-plus-fixed-fee basis, totaling \$923,000.

Crown Cork & Seal Co., Eastern Avenue and Kresson Street, Baltimore, metal bottle caps, capping machinery, etc., has let general contract to Frantz Construction Co., 10 West Chase Street, for one-story addition. Cost about \$80,000 with equipment. Lucius R. White, Jr., last noted address, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 3 for 183 pneumatic drills for Philadelphia and Charleston, S. C., Navy yards; six angle grinders, seven pneumatic wrenches, six pneumatic holders-on, 24 horizontal grinders and three bench ramblers for Charleston yard (Schedule 4095); 18 gasoline engine-driven tractors, nine winches, nine bulldozers and nine cranes for Charleston, S. C., and Mare Island yards (Schedule 4143); hydraulic horizontal forcing press for Eastern or Western yard (Schedule 4114).

The South

• **Scripto Mfg. Co.**, 425 Houston Street, Atlanta, Ga., automatic lead pencils and other metal specialties, has let general contract to Van Winkle & Watkins Co., Peters Building, for three-story plant, 60 x 85 ft., with one-story building adjoining for storage and distribution. Cost over \$60,000 with equipment. Walter McDonald, 140 Peachtree Street, N. E., is architect and engineer.

Constructing Quartermaster, Fort Monroe, Va., asks bids until Dec. 5 for one-story aircraft repair and maintenance shop for Air Corps at Langley Field, Va.

Jefferson Island Salt Co., 401 West Main Street, Louisville, has plans for rebuilding salt-mining, storage and distributing plant at Jefferson Island, La., destroyed by fire a few

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Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Dec. 2 for one 50-ton gantry crane for intake at Watts Bar power dam.

Continental Can Co., 100 East Forty-second Street, New York, has let general contract to Austin Co., Cleveland, for one-story addition, 160 x 200 ft., to branch plant at Tampa, Fla. Cost close to \$100,000 with equipment.

Constructing Quartermaster, Maxwell Field, Montgomery, Ala., has let general contract to Algernon Blair, First National Bank Building, for airplane hangar, with repair and reconditioning facilities, and for boiler plant, at flying school, Montgomery municipal airport, at \$114,625; also for similar structures at Valparaiso, Fla., for flying school, at \$120,706.

Norfolk & Western Railway Co., Norfolk, Va., has approved plans for new one-story warehouse at local terminal. Cost about \$650,000 with mechanical-handling, conveying and other equipment. Company also has authorized fund of \$36,000 for track scales in Norfolk district.

Quartermaster General, Munitions Building, Washington, has appropriation of \$1,764,600 for work at Morrison Field, West Palm Beach, Fla., including hangars with repair and reconditioning facilities, warehouses, machine and mechanical shops, oil and gasoline storage tanks and distribution system, control tower, radio buildings and other structures.

Central States

● **Cleveland Interurban Railway Co.**, Terminal Tower Building, Cleveland, has let general contract to Sam W. Emerson Co., 1836 Euclid Avenue, for one-story addition to car repair and maintenance shops at 2901 East Sixty-seventh Street, 119 x 142 ft., with extension 30 x 34 ft. Cost over \$100,000 with equipment. Wilbur Watson & Associates, Inc., 4614 Prospect Avenue, is engineer.

Inland Mfg. Division, General Motors Corp., Dayton, plastic products for automobiles, has asked bids on general contract for two-story addition, 120 x 150 ft. Cost close to \$125,000 with equipment. Argonaut Realty Division, General Motors Research Building, Detroit, is engineer.

Cleveland Screw Products Co., 3062 East Ninety-third Street, Cleveland, has let general contract to H. G. Statmyer & Son Construction Co., 203 Lakeside Avenue, N. W., for one-story addition, 60 x 80 ft. Cost about \$45,000 with equipment.

Goodyear Tire & Rubber Co., Akron, Ohio, has authorized multi-story addition to chemigum (artificial rubber) plant to increase capacity by 20,000 lb. per day. Cost over \$2,000,000 with machinery.

National Bronze & Aluminum Foundry Co., East Eighty-eighth Street and Laisy Avenue, Cleveland, will begin erection of one-story addition for a heat-treating unit. H. L. Vokes Co., 5300 Chester Avenue, is general contractor. Cost about \$45,000 with equipment.

Bendix Aviation Corp., Westmore Street, South Bend, Ind., aircraft instruments, precision parts, etc., has let general contract to Austin Co., Cleveland, for one-story addition, 30 x 500 ft. Cost close to \$400,000 with equipment.

United States Machine Corp., Lebanon, Ind., automatic stokers and parts, has approved plans for one-story addition, 100 x 125 ft. Cost over \$60,000 with equipment.

Monsanto Chemical Co., 1700 South Second Street, St. Louis, has let general contract to Fruin-Colnon Contracting Co., 408 Olive Street, for one-story addition, 60 x 120 ft., for storage and distribution. Cost over \$50,000 with equipment.

Curtiss Aeroplane Division, Curtiss-Wright Corp., Buffalo, has asked bids on general contract for new plant at Lambert-St. Louis Airport, St. Louis, for production of military airplanes for Government, consisting of one and multi-story units, about 1,200,000 sq. ft. of floor space, for parts production, assembling, testing and other service, including foundry unit and finishing department for castings. Cost about \$8,000,000 with equip-

ment. Albert Kahn Associated Architects & Engineers, Inc., Detroit, is architect and engineer.

Lockwood Warehouse Co., Lockwood Drive, Houston, Tex., has let general contract to Brown Construction Co., 4102 Montrose Boulevard, for one and two-story bulk grocery plant, 190 x 415 ft. Cost close to \$185,000 with conveyors, loaders and other mechanical-handling equipment.

Truscon Steel Co., Youngstown, Ohio, plans new factory branch, storage and distributing plant on part of 13-acre tract in Esperson Industrial District, Houston, Tex. It will consist of two main one-story buildings, each about 100 x 100 ft., with two-story air-condition office. Cost over \$85,000 with equipment. Joseph Finger, Inc., Bankers' Mortgage Building, Houston, is architect.

Bundy Tubing Co., 10951 Hern Street, Detroit, brass, steel and other metal tubing, has let general contract to Bryant & Detwiler Co., Penobscot Building, for new one-story plant in Warren Township, near Detroit. Cost close to \$100,000 including equipment. Smith, Hinchman & Grylls, Inc., Marquette Building, is architect and engineer.

Wilcox-Rich Division, Eaton Mfg. Co., Battle Creek, Mich., automobile engine valves, valve tappets and kindred equipment, has let general contract to G. O. Lewis Co., Battle Creek, for one-story addition. Cost about \$140,000 with equipment.

Chevrolet Motor Division, 3044 West Grand Boulevard, Detroit, plans one-story addition, 120 x 200 ft., for expansion in gear and axle departments. Cost close to \$200,000 with equipment. Albert Kahn Associated Architects & Engineers, Inc., New Center Building, is architect and engineer.

Muskegon Motor Specialties Co., Muskegon, Mich., automotive parts and equipment, plans one-story addition for production of camshafts for aircraft engines to be manufactured by Packard Motor Car Co., Detroit, for Government. Cost over \$70,000 with equipment.

Saginaw Steering Gear Division, General Motors Corp., Saginaw, Mich., has approved plans for one-story addition, 360 x 660 ft. Cost over \$500,000 with equipment. Award for excavation and foundations has been let to Spence Brothers, Saginaw.

Russakov Can Co., 850 North Ogden Avenue, Chicago, metal cans and other sheet metal specialties, has let general contract to Poirot Construction Co., 2001 West Pershing Road, for two-story top addition to plant at 850 North Carpenter Street, 148 x 160 ft. Cost close to \$140,000 with equipment. A. Epstein, 2001 West Pershing Road, is engineer.

A. W. Cash Valve Mfg. Co., North Water Street, Decatur, Ill., valves and kindred engineering specialties, will take bids at once on general contract for one and two-story addition, 105 x 160 ft. Cost close to \$100,000 with equipment. Harris & Spangler, Standard Life Building, are architects.

Rhineland Paper Co., Inc., Rhineland, Wis., glassine, grease-proof and other processed papers, has let general contract to C. R. Meyer & Sons Co., 50 State Street, Oshkosh, Wis., for one-story and basement addition, 102 x 450 ft., for expansion in machine division, heater room and finishing department, with smaller one-story building for digester room; also for addition, 27 x 65 ft., to steam power house. Cost over \$400,000 with equipment.

Wisconsin Public Service Corp., Milwaukee, is arranging fund of about \$4,475,000 for expansion and improvements in plants and system during 1941, of which approximately \$2,600,000 will be used for expansion in Bay-side steam-electric generating station at Green Bay, Wis., installation to include turbine-generating unit, high-pressure boilers and auxiliary equipment; new transmission line for connection with system of Wisconsin-Michigan Power Co., cost about \$100,000; transmission line from Green Bay to Manitowoc, Wis., about \$105,000; and other work, including distributing lines, power substations, switching stations and other structures.

Gillett & Eaton, Inc., Lake City, Minn., semi-steel castings, etc., plans new one-story foundry to replace plant recently destroyed by fire. Cost close to \$45,000 with equipment.

Bureau of Reclamation, Denver, asks bids until Dec. 2 for two motor-driven pumping units and accessories, each with capacity of

20.5 cu. ft. per sec., under head of 109 ft., for Terry pumping station, Buffalo Rapids project, Mont (Specifications 1454-D).

Logan Engineering Co., 4901 Lawrence Avenue, Chicago, mining equipment and parts, plans one-story addition. Cost close to \$45,000 with equipment. Joseph A. Nelson, 5248 North Glenwood Avenue, is architect.

Wehr Steel Co., West Mobile Avenue, West Allis, Wis., steel castings, etc., has let general contract to Klug & Smith Co., 111 East Wisconsin Avenue, Milwaukee, for one-story addition, 75 x 190 ft. Cost over \$75,000 with equipment.

Advance Aluminum Castings Corp., 2742 West Thirty-sixth Place, Chicago, has let general contract to Olsen & Berg, 7957 Rhodes Avenue, for one-story foundry addition, 85 x 120 ft. Cost close to \$70,000 with equipment. Koehler & Larson, 506 West Sixty-third Street, are architects.

Western States

● **Parachute Corp. of America, Inc.**, 935 North Pacific Street, Glendale, Cal., plans new one-story plant, about 50,000 sq. ft. of floor space, at Century Boulevard and Airport Way, near Los Angeles municipal airport. Cost close to \$150,000 with equipment.

Douglas Aircraft Co., Inc., Santa Monica, Cal., has let general contract to P. J. Walker Co., 3900 Whiteside Avenue, Los Angeles, for new plant on 200-acre tract at Long Beach, Cal., comprising 11 separate units for parts production and assembling, totaling about 1,422,350 sq. ft. floor space. Plant has been designed to be entirely invisible from ground or sky at night, will be completely air-conditioned and will employ about 15,000 workers. Cost about \$11,000,000 with equipment. Edward G. and Ellis W. Taylor, 803 West Third Street, Los Angeles, are architects and engineers.

Commanding Officer, Ordnance Department, Benicia Arsenal, Benicia, Cal., asks bids until Dec. 5 for four electric low-lift platform-type trucks, each 6000-lb. capacity; four electric, high-lift, platform-type, non-telescoping trucks, 6000-lb. capacity; one 2000-lb. fork-type, tiering, tilting, telescoping, electric truck; three gas-electric truck units; five 500-lb. each non-telescoping electric stackers; two 5000-lb. each hand-operated lift-type trucks, and one set of automatic charging equipment (Circular 27).

Ducommun Metals & Supply Co., 219 Central Avenue, Los Angeles, has let general contract to Joshua H. Marks-Charde Co., 816 West Fifth Street, for one and two-story storage and distributing plant, 150 x 240 ft., with adjoining smaller unit, at Alameda Avenue and Forty-ninth Street. Cost about \$250,000 with equipment. Albert C. Martin, Higgins Building, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Dec. 3 for two vertical turret lathes and accessories (Schedule 4136) for Puget Sound Navy Yard, Bremerton, Wash.; two drilling and tapping machines (Schedule 4125) all motor-driven; until Dec. 5, two motor-driven centrifugal pumping units and spare parts (Schedule 4098) for Mare Island yard.

Canada

● **Crane, Ltd.**, 1170 Beaver Hall Hill, Montreal, valves, steam specialties, etc., Canadian subsidiary of Crane Co., Chicago, will begin superstructure for one-story addition, for which Davidson-Grant Construction Co., Ltd., 630 Dorchester Street West, is general contractor. Cost close to \$50,000 with equipment. T. Pringle & Son, Ltd., 485 McGill Street, is architect and engineer.

Canada Wire & Cable Co., Ltd., Leaside, Toronto, Ont., has let general contract to R. J. Hibbs Construction Co., Ltd., 15 Trent Avenue, for one-story addition, 95 x 140 ft. Cost close to \$100,000 with equipment.

B. A. Brewing Co., Ltd., 130 Bruce Street, Windsor, Ont., plans expansion and improvements, including additional equipment, for increased capacity in different departments. Cost over \$50,000 with equipment.